
Washington State Wetland Mitigation Evaluation Study Phase 2: Evaluating Success

Appendix F Project Summaries



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**Washington State Wetland Mitigation Evaluation Study
Phase 2: Evaluating Success**

**Appendix F
Project Summaries**

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Note: The project summaries are an attempt to summarize the information used in evaluating the projects for the Phase 2 Wetland Mitigation Evaluation Study. In no way are these summaries inclusive of all the information used in the evaluations. The information provided in this document is a result of a thorough review of available project file information, on-site assessment and site evaluation information. In addition, some of the results of the consultant/applicant questionnaires were incorporated in to the summaries.

Plants are abbreviated in most cases with a four-letter word. The first two letters are from the first two letters of the genus and the second two letters are the first two letters of the species. For example, PHAR is the abbreviation for *Phalaris arundinacea* or reed canary grass. Please refer to the plant species list after the project summaries for a complete list of plant species observed during the Phase 2 site assessments, including each plants wetland indicator status.

List of Acronyms and Abbreviations

CAO.....	Critical Areas Ordinance
Corps.....	United States Army Corps of Engineers
Ecology.....	Washington State Department of Ecology
EPA.....	Environmental Protection Agency
GPS.....	Global Positioning System
HGM.....	Hydrogeomorphic
km.....	kilometers
m.....	meters
MFR.....	Memorandum for Record
NRCS.....	National Resource Conservation Service
NWI.....	National Wetland Inventory
NWP 26.....	Nationwide Permit issued for discharges to headwaters and isolated waters
PAB or AB.....	*Palustrine Aquatic Bed or Aquatic Bed
PEM or EM.....	*Palustrine Emergent or Emergent
POW or OW....	*Palustrine Open Water or Open Water
PSS or SS.....	*Palustrine Scrub-Shrub or Scrub-Shrub
PFO or FO.....	*Palustrine Forested or Forested
P.S.	Performance Standard(s)
SAT.....	Site Assessment Team
SET.....	Site Evaluation Team
USFWS.....	United States Fish and Wildlife Service
WET.....	Wetland Evaluation Technique
wl.....	wetland

*Wetland classification according to:

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of Wetlands and Deepwater Habitats of the United States. U.S. Fish and Wildlife Service. FWS/OBS-79/31.

Impact Information

This project, implemented by a public entity, is located in Whatcom County. It entailed the filling, grading and/or clearing of 21.1 acres of wetlands under a Corps Individual Section 404 (Clean Water Act) permit. The activities resulted in the direct elimination of 3 acres of wetlands and a reduction in the functions and values associated with the remaining impacted wetlands (USFWS letter). A total of 3.6 acres of PFO and PSS wetlands and 17.5 acres of PEM wetlands were filled, graded and/or cleared. Eleven separate isolated wetlands were lost. Much of the wetland acreage was managed or disturbed. There were no wetland ratings provided for the impacted wetlands.

Dominant vegetation and water sources

There were several vegetation types throughout the wetlands. One was an EM community, which consisted of *Festuca* spp. and *Agrostis* spp. JUEF, PHAR, DAGL, *Cirsium* spp., and HOLA also occurred. A second EM community type was dominated by TYLA, SCMI, CAOB, and PHAR. ALPL-AQ, ELPA, and JUEN also occurred. These areas were wetter and occurred less frequently. One wetland contained 3.6 acres of FO and SS wetland. THPL, ALRU, POTRI dominated the canopy layer. COSE dominated the shrub layer. *Salix* spp., RUSP, SPDO, ACCI, and SYAL occurred commonly, with *Tolmiea menziesii* and SODU as the common species in the understory.

The water source for the impacted wetlands was primarily precipitation as there were no seasonal or permanent streams entering or exiting the area. Standing water collected seasonally within shallow depressions. During periods of heavy precipitation, water on-site drained as sheet flow.

Functions provided

The project consultant used a qualitative approach based on scientific literature to evaluate the filled, graded, and/or cleared wetlands. According to the final mitigation plan for this project, the lost wetlands provided low to medium groundwater exchange, stormwater attenuation and storage, water quality improvement, and wildlife habitat.

The EPA expressed concern, in a comment letter, that together the managed PEM grassland wetlands provided important habitat and food chain support for song birds, small mammals, raptors and other organisms. They also provided water quality, sediment trapping and other important wetland functions. The EPA was also concerned with cumulative impacts to headwater and isolated wetlands on the property. They were not satisfied with the proposed mitigation since there was no proposal to offset FO wetland losses in-kind. They were willing to accept off-site mitigation.

The USFWS also expressed concern, in a comment letter, that the development would result in the direct loss of a FO wetland system which would reduce fish and wildlife habitat availability. There would be an overall reduction and net loss of wetland habitat values due to the conversion of a FO and SS wetland to an EM wet meadow wetland. In addition, increased erosion, surface runoff and siltation due to construction activities would result in overall decreased water quality. The overall concern was that the proposed project would result in net loss of several classes of wetland habitat.

The applicant proposed out-of-kind replacement of a FO wetland class with wetland classes of reduced values because of site constraints, specifically; the creation of 12.7 acres of limited and lesser value wetlands in place of a currently functioning mixed class wetland.

Wetland Mitigation Required/Implemented

This project required a total of 21.1 acres of mitigation. This included the creation of 16.1 acres (Site A = 3.40 acres, Site B = 12.70 acres) of wetlands and enhancement of 5 acres (Site C) of wetlands on-site. In addition, approximately 75 acres on the property was required to be preserved in perpetuity. Stream channel enhancement within the preservation area was also required. The *goals* of the mitigation plan were:

- To compensate in-part for the loss of functions and values associated with the impacted wetlands;
- To simulate Pacific Northwest wetlands in their cover/abundance, vegetative structure and plant community composition;
- To create vegetated buffers in upland areas adjacent to the mitigation wetlands on the property where possible to separate the wetlands from nearby possible disturbance; and
- To provide the public with an educational opportunity regarding the functions and values of wetlands in urban and suburban areas.

Each of the above goals had several specific objectives not listed here, which indicated how the goal would be achieved. The proposed Cowardin classes were PEM and PSS for Area A, PEM for Area B and PSS for Area C for a total of 14.7 acres of PEM and 6.4 acres of PSS.

Note: Mitigation Area B (12.7 acres) was also included as an impact (part of the 21.1 acres of permitted impacts). This area was cleared and re-graded as part of the development project. Therefore, Area B was created as a result of the re-grading of the site.

Major mitigation actions included:

1. Lowering the ground elevation to encourage seasonal saturation in Area A;
2. Planting with wet meadow grasses and SS vegetation in Area A;
3. Regrading and planting with herbaceous species in Area B; and
4. Lowering the basin floor to increase the duration of saturated soil conditions and planting shrub vegetation in Area C.

Area A and Area B were at the top of the watershed and thus derived much of their water from precipitation. Clay-rich soils impeded groundwater exchange. Due to the site locations, creation that would attract wildlife species, particularly waterfowl, was not allowed. Area C, an old stormwater detention facility, was still to receive stormwater flow.

Monitoring was required in years 1, 2, 4, 6, and 8 to determine percent survival of original plantings, condition of live plantings, plant species composition, percent vegetative cover, soil profile descriptions in areas where soil was imported, and hydrological conditions including depth of seasonal saturation and ponding. Permanent transects were used for vegetation monitoring.

Area C – Pre-enhancement conditions

This area was vegetated with a mix of herbaceous species. TRRE was dominant throughout the area, with HOLA commonly occurring. Clumps of ALRU saplings occurred occasionally. There were also a few swales at lower elevations with EPCI, JUEN, JUBU, MYLA, and VESC. A few small depressional areas supported ALPR, ALPL-AQ, *Salix* spp., and TYLA.

Site Assessment Information

The mitigation sites were approximately six years old at the time of the site visit. The SAT identified approximately 19.69 acres (15.34 acres of creation, and 4.35 acres of enhancement) of wetlands. This is within the 10% margin of error for acreage establishment.

There were three mitigation sites for this project:

- Area A (3.11 acres) was an EM flat wetland dominated by *Lupinus* spp., *Trifolium* spp., and grass spp. (ALPR, FERU, and LOCO). There were some shrubs on-site that may constitute a SS class in the next couple of years;
- Area B (12.23 acres) was an EM flat wetland dominated by *Trifolium* spp. and grass spp. (*Agrostis* spp., ALPR, FERU, and *Lolium* spp.). This area is continually mowed. Note: 12.7 acres of creation was required in this area and was also included as an impact (part of the 21.1 acres of permitted impacts). This area was cleared and re-graded as part of the development project. Therefore, Area B was created as a result of the re-grading of the site; and
- Area C was an EM (1.74 acres) and SS (2.61 acres) depressional outflow wetland that was dominated by ALRU, *Carex* spp., ELPA, *Juncus* spp., grass spp., including PHAR, *Salix* spp., and TYLA. The SS areas were converted from already existing EM wetland areas (-2.61 acres of EM). This area is an old detention pond surrounded by a sloping buffer. It was determined to be of an atypical morphology due to the steep nature of the side slopes. There are two inlets and one outlet, which can be controlled to hold back more water. Wildlife observations made in Area C included: Willow flycatcher, red-wing blackbirds, black-cap chickadee, orange-crown sparrow, American robin, Pacific tree frog, and an unidentified snake. Egg masses were also observed (Phase 1).

These three sites were considered to be Category 3 wetlands (Area A-15 points, Area B -13 points and Area C -18 points) according to the WA State Wetland Rating System for Western Washington¹.

Site Evaluation Results

Did the mitigation project achieve the ecologically relevant measures?

1. The mitigation project established the acreage (within 10%) for the required mitigation activity (19.69 acres established/ 21.1 acres required). **YES**
2. This project had 11 performance standards (P.S):
 - Four of the P.S. were assessed during Phase 2;
 - Two of the assessed P.S. were attained (50%);
 - One of the assessed P.S. was considered to be significant; and
 - The significant P.S. was not attained (0%).

Therefore, this project did not attain the significant P.S. **NO**

3. This project somewhat fulfilled the appropriate goals and objectives. The project replaced most functions, except habitat that the FO and SS areas provided. One goal was to provide educational opportunities at Area C. They were to accomplish this by installing an interpretive sign. There was no sign, however it was determined that this was not an ecologically appropriate goal. **SOMEWHAT**

Based on the above, **the mitigation was determined to be SOMEWHAT achieving the ecologically relevant measures.**

¹ Washington State Department of Ecology. 1997. Washington State Wetlands Rating System –Western Washington. Second Edition. Publication #96-94. Olympia, WA.

Phase 1 Comparison– This mitigation project was determined to be built to plan in Phase 1. Of the 11 P.S., four out of five (80%) of the P.S. assessed using the Phase 1 methods were met. The one P.S. that was not met was not considered significant in Phase 2. This project was determined to be somewhat in compliance in Phase 1.

Did the mitigation project adequately compensate for the impacts?

The following table provides an overview of the results from the function assessment evaluations for Area A. Area A is a flat (HGM type) wetland. There are currently no function assessment models for flat wetlands. Therefore, the potentials were determined based on the data /characteristics collected on the function assessment forms rather than the calculated scores.

FUNCTION	Pre-P.	Poten.	Oppor.	Contri.	Comments
Sediments	NA	NA	NA	NA	Does not perform (site is at top of watershed, the water source is precipitation).
Nutrients	NA	NA	NA	NA	“
Metals/toxic organics	NA	NA	NA	NA	“
Peak flows	NA	ML	M	MOD	Minimal storage
Downstream erosion	NA	ML	M	MOD	“
General habitat	NA	ML	M	MOD	
Invertebrates	NA	L	-	MIN	
Amphibians	NA	L	-	MIN	
Anadromous fish	NA	NA	NA	NA	Not fish habitat
Resident fish	NA	NA	NA	NA	“
Wetland assoc. birds	NA	ML	-	MOD	
Wetland assoc. mammals	NA	L	-	MIN	
Native plant richness	NA	L	-	MIN	
Primary prod/export	NA	M	-	HI	

*Pre-P. = pre-potential of the site to perform a function; Poten. = current potential of the site to perform a function; Oppor. = opportunity of the site to perform function; Contri. = contribution of mitigation activities to the performance of a function.

*NA = Not Applicable; L = Low; ML = Moderately low; M = Moderate; MH = Moderately high; H = High.

*NAA = Not at all contributing; MIN = Minimal contribution; MOD = Moderate contribution; HI = High contribution.

The following table provides an overview of the results from the function assessment evaluations for Area B. Area B is a flat (HGM type) wetland. There are currently no function assessment models for flat wetlands. Therefore, the potentials were determined based on the data/characteristics collected on the function assessment forms rather than the calculated scores.

FUNCTION	Pre-P.	Poten.	Oppor.	Contri.	Comments
Sediments	NA	NA	NA	NA	Does not perform (site is at top of watershed, the water source is precipitation).
Nutrients	NA	NA	NA	NA	“
Metals/toxic organics	NA	NA	NA	NA	“
Peak flows	NA	L	L	NAA	No veg structure, minimal depressions
Downstream erosion	NA	L	L	NAA	“
General habitat	NA	L	M	MIN	
Invertebrates	NA	L	-	MIN	
Amphibians	NA	L	-	MIN	
Anadromous fish	NA	NA	NA	NA	Not fish habitat
Resident fish	NA	NA	NA	NA	“
Wetland assoc. birds	NA	L	-	MIN	
Wetland assoc. mammals	NA	L	-	MIN	
Native plant richness	NA	L	-	MIN	
Primary prod/export	NA	ML	-	MOD	

The following table provides an overview of the results from the function assessment evaluations for Area C. The potential of the site to perform functions was based on the scores from the function assessment model for depressional outflow wetlands. The pre-potential of the site to perform functions was based on the physical description of the characteristics and structure of the wetland prior to enhancement activities and relied on expert knowledge to determine the level of functioning. This was done using the approach for decision-making².

FUNCTION	Pre-P.	Poten.	Oppor.	Contri.	Comments
Sediments	H	H	M	NAA	
Nutrients	M	MH	H	MOD	Added organics to soil. Good detention, high sedimentation
Metals/toxic organics	M	MH	H	MOD	Fluctuating water levels, vegetation structure, organics added, retention of flows
Peak flows	MH	MH	H	NAA	
Downstream erosion	H	H	H	NAA	
General habitat	L	ML	M	MIN	
Invertebrates	L	M	-	MOD	
Amphibians	L	ML	-	MIN	
Anadromous fish	NA	NA	NA	NA	Not fish habitat
Resident fish	NA	NA	NA	NA	Not fish habitat
Wetland assoc. birds	ML	ML	-	NAA	
Wetland assoc. mammals	L	L	-	NAA	Artificial stormwater
Native plant richness	L	M	-	MOD	
Primary prod/export	H	H	-	NAA	

Summary of Functions for Area A

- *Water quality* – Does not perform (NA)
The site is at the top of the watershed, hydrology is precipitation (flat wetland).
- *Water quantity* – Moderately Low potential , Moderate contribution
- *General habitat* – Moderately Low potential, Moderate contribution

Summary of Functions for Area B

- *Water quality* – Does not perform (NA)
The site is at the top of the watershed, hydrology is precipitation (flat wetland).
- *Water quantity* – Low potential, No contribution
- *General habitat* – Low potential, Minimal contribution

Summary of Functions for Area C

- *Water quality* – Moderately high potential, Moderate contribution
- *Water quantity* – Moderately high potential, No contribution
- *General Habitat* – Moderately low potential, Minimal contribution

Overall Rationale

This project resulted in the filling, grading and/or clearing of a total of 21.1 acres (3.6 acres of PFO and PSS wetlands and 17.5 acres of PEM wetlands). The mitigation activities resulted in 15.34 acres of created EM wetland and 4.35 acres (2.61 acres of SS and 1.74 acres of EM) of enhanced existing wetland. There was a net loss of 5.76 acres (21.1 acres – 15.34 acres) of

² Hruby, T. 1999. Assessments of Wetland Functions: What They Are and What They Are Not. Environmental Management 23 (1): 75-85.

wetlands, which included a net loss of 0.99 acres (3.6 acres impacted – 2.61 acres enhanced) of FO and SS wetlands.

The mitigation sites did not adequately replace the functions associated with the lost wetlands. The project provided 1:1 mitigation using creation and enhancement, however the mitigation did not provide for replacement of wildlife habitat or native wetland plant diversity. Area B (the largest creation area) provided minimal to no contribution, while the enhancement activities in Area C at best provided a moderate contribution to the potential performance of functions. Therefore, the contribution of the mitigation activities did not completely compensate for the loss of almost six acres of wetlands. The preservation area has an upland/wetland mosaic and the stream channel was enhanced, which provides functions that were in addition to, or in exchange for, functions lost. **It was determined that this mitigation project SOMEWHAT compensated for the impacts.**

Overall Success and Possible Factors Correlated with Success

This creation project was considered **MINIMALLY SUCCESSFUL** (the project somewhat achieved the ecologically relevant measures and somewhat compensated for the impacts). The main factors that could have determined the outcome of this project are listed below.

Contributed to success

- Good water source for Area C;
- Soil amendments used for Area C; and
- Good implementation and follow-up.

Did not contribute to success

- Constraints of site and the required maintenance;
- Lack of soil amendments in Areas A and B; and
- Use of non-native seed mix in Area B.

Was the mitigation site the same HGM and Cowardin class(es) as the impacts?

The mitigation project provided somewhat the same HGM subclasses as the lost wetlands. Area A and B (flat wetlands) were the same HGM type as the lost wetlands, however Area C was not. It was a depressional outflow wetland that had atypical morphology (steep side slopes). The mitigation project did not provide the same Cowardin classes because the SS and FO areas were not replaced. There was a net loss of 0.99 acres of FO/SS wetlands as a result of the development activities.

Ecological Condition

Hydroperiods

Areas A, B, and C had areas with seasonal inundation (> 1 month) and saturation (seldom inundated). Area B also had areas of occasional inundation (< 1 month).

Dominance by Non-Native Plant Species

At the time of the site visit, non-native species dominated >75% of the cover within Areas A and B, and 1-24% of the cover within Area C.

Plant Species Diversity

The SAT identified 25 native species and 24 non-native species in Area A, 6 native species and 14 non-native species in Area B, and 47 native species and 17 non-native species in Area C.

Buffers

At the time of the site visit, Area A had a moderately high quality buffer (100m of forest, scrub, relatively undisturbed grassland or open water around at least 50% of the wetland). Both Areas B and C had low quality buffers (have paved roads within 25m around at least 5% of the wetland).

Corridors and Connectivity

At the time of the site visit, Area A had high connectivity and corridors to other habitat areas (the site is connected to a corridor > 50m wide with > 30% cover of forest or shrub to a natural upland area or open water). Areas B and C had minimal corridors to and connectivity to other habitat areas (the sites are connected to relatively undisturbed areas with a vegetated corridor 5-50m wide).

Land Uses

Within 1 km of Area A the land uses were as follows: 40% developed (6% high density residential, 6% low density residential and 28% urban/commercial), 50% undeveloped (45% undeveloped forests and 5% other undeveloped areas), and 10% agriculture.

Within 1 km of Area B the land uses were as follows: 51% developed (13% high density residential, 8% low density residential and 30% urban/commercial), 34% undeveloped (21% undeveloped forests and 13% other undeveloped areas), and 15% agriculture.

Within 1 km of Area C the land uses were as follows: 54% developed (14% high density residential, 12% low density residential, and 28% urban/commercial), 35% undeveloped (24% undeveloped forests and 11% other undeveloped areas), and 11% agriculture.

Impact Information

This project, implemented by a public entity, is located in Skagit County. It entailed the filling of 1.76 acres of wetlands under a Corps NWP 26. The wetlands lost were part of an EM (farmed wet pasture), mostly seasonally saturated, depressional outflow/slope wetland. The site was located on a post-glacial terrace just above the 100-year flood plain of a river. The site drops off steeply on both the west and east sides in to two ravines, which have been cut downward through the terrace by small streams. The perennial stream in the ravine to the west is dammed to form a small pond, the surface of which is several feet lower in elevation than the project site. An intermittent stream drains through a forested ravine east of the site, the bottom of which is approximately 15 feet below the site. The site had been used for harvesting grass hay, mowed at least annually. The entire wetland was considered a Category 3 (12 points) according to the WA State Wetland Rating System for Western Washington (see footnote 1 p. 3).

Dominant vegetation and water sources

The vegetation was a mix of native and non-native grasses (*Agrostis tenuis*, FEAR, HOLA), JUEF, and other herbaceous species (CIVU, PLLA, RARE, *Veronica serpyllifolia*).

Precipitation and subsurface movement of water draining from upper terraces to the river valley supported the water regime.

Functions provided

According to the delineation report for this project, primary functions provided by the wetlands included water quality improvement, wildlife habitat, and cultural values. The site's value for water quality improvement was low because the site did not receive direct stormwater runoff from developed sites but instead received subsurface drainage from on-site. Also, there was a topographic break between the closest group of buildings, lawns, and parking areas on-site and the project site, therefore it was not expected that many pollutants would reach the site, thus limiting its water quality function. Wildlife habitat value was limited to foraging and some cover. Cultural values were also low. The wetland did not provide a significant level of flood storage due to its relatively continuous slope (and resulting inability to retain surface water) and its small size relative to the river valley. The site was not associated with the deep groundwater table and, therefore, was not a groundwater recharge or discharge site. It was also not associated with the shoreline of a surface water feature.

A Corps MFR indicated that, in general, the wetlands have moderate value for the water quality and storage functions and that wildlife value was low due to mowing.

Wetland Mitigation Required/Implemented

This project required the enhancement of the remaining on-site wetlands (2.21 acres) as well as 2 acres of upland buffer.

Background information

The mitigation plan included the upland enhancement in the mitigation ratio resulting in a 2.4:1 ratio. The thought was that the establishment of woody vegetation throughout these habitats would increase the vegetative and structural habitat value of all remaining undisturbed on-site areas, as well as provide a vegetated connection between the adjacent off-site forested areas

located east and west of the project site. In a Corps MFR, it was indicated that lumping wetland and upland enhancement to generate a compensation ratio was unacceptable. Therefore, the mitigation ratio was determined to be 1.1:1. Ecology would have liked to see a higher mitigation replacement ratio. However, there was a limited amount of acres available on-site for enhancement, therefore out-of-kind mitigation by way of fisheries improvement and dam safety reparation was allowed because it was felt that this mitigation measure would provide the greatest ecological benefit within the watershed/drainage basin.

The overall *goal* of the wetland mitigation project was:

- To guarantee no net loss of wetland function and value would result from project implementation.

The *objective* was:

- To convert the degraded EM wetland to a habitat dominated by a diverse community of native woody wetland species (SS and FO).

Major mitigation actions included:

1. Planting; and
2. Placement of an infiltration line, which supplements the water regime by supplying, treated stormwater to the mitigation area.

The first plantings were installed in December and January and the planting plan was modified in the field to take advantage of pre-existing wet and upland conditions. Planted species, included COSE, LOIN, SASC, SASI, and SALU in the wetter areas and ALRU, BEPA, CRDO, POTRI, PYFU, RONU, RUSP and in the remaining areas with PISI for habitat diversity. The plants were irrigated the 1st, 2nd and 4th growing season. Additional plants were planted the 2nd and 4th year in order for the site to attain the P.S.

Fifteen randomly selected five-meter radius plots were used to monitor percent survival, cover, health and vigor of planted vegetation. The water levels were monitored using staff gauges and monitoring wells.

Problems included herbivory and plant die-off.

Site Assessment Information

This site was approximately 3 years old at the time of the site visit. The SAT identified approximately 3.11 acres (2.71 acres EM and 0.40 acres SS) of enhanced wetland. This is within the 10% margin of error for acreage establishment. Note: the additional 0.9 acres of created wetland identified on-site most likely was a result of the reduction in the size of the surrounding upland areas that were required as buffer.

The mitigation site was very similar to the pre-enhancement conditions (see impact site description) except for the establishment of 0.40 acres of SS, which was concentrated along the infiltration line, and an increase in water level fluctuations over the entire site (due to the additional water being supplied by the infiltration line). JUEF and HOLA were the dominant EM species, while ALRU and SASI were the dominant SS species. Moss was also abundant in areas that did not receive long duration inundation. Dried algae were also observed on stalks of vegetation and covering the ground in certain areas. Certain species, including BEPA and PYFU were to be planted but the SAT did not locate individuals during the Phase 2 site assessment.

Wildlife observations included: red-tail hawks using the site and nesting within 300' of the wetland, and evidence of deer browsing (trees girdling).

This site was considered to be a Category 2 (23 points) wetland according to the WA State Wetland Rating System for Western Washington (see footnote 1 p. 3).

Note: Prior to enhancement this site was considered a Category 3 wetland according to the Wetland Rating System. The increase in score was primarily a result of added structure and diversity within the wetland due to the establishment of SS vegetation.

Site Evaluation Results

Did the mitigation project achieve the ecologically relevant measures?

1. The mitigation project established the acreage (within 10%) for the required mitigation activity (3.11 acres established/2.21 acres required). **Yes**
2. The project had a total of nine performance standards (P.S.):
 - Four of the P.S. were assessed during Phase 2;
 - Two of the assessed P.S. were attained (50%);
 - All four of the standards were considered to be significant; and
 - Two of the significant standards were attained (50%).Therefore, this project somewhat attained the significant P.S. **SOMEWHAT**
3. The project met about half of its goals. The mitigation activities did not provide 2.21 acres of PFO and mixed PSS wetlands, but they did increase wildlife habitat functions by providing some structural diversity. **SOMEWHAT**

Based on the above, **the mitigation was determined to be SOMEWHAT achieving the ecologically relevant measures.**

Phase 1 Comparison– This mitigation project was determined to be built to plan in Phase 1. Of the nine P.S., three out of three (100%) of the P.S. assessed using the Phase 1 methods were met. Two of those P.S. were not being attained in Phase 2 and one additional standard was assessed using the Phase 2 methods. This project was determined to be in compliance in Phase 1.

Did the mitigation project adequately compensate for the impacts?

The following table provides an overview of the results from the function assessment evaluations. This mitigation area is a slope wetland with depressions that outflow. There are currently no function assessment models for slope wetlands or slopes with depressions. Therefore, the potentials were determined based on the data/characteristics collected on the function assessment forms rather than the calculated scores. Ratings were made based on a comparison to other slope wetlands using the approach for decision-making (see footnote 2 p. 5).

FUNCTION	Pre-P.	Poten.	Oppor.	Contri.	Comments
Sediments	M	MH	M	MIN	Increase in wl area and area of seasonal inundation (microdepressions), however loss of EM, which is better at removing sediments than SS
Nutrients	ML	M	M	MIN	MH for phosphorous, ML for nitrogen (No organics, but more surface ponding)
Metals/toxic organics	ML	M	H	MOD	Increase in wl area and area of seasonal inundation (microdepressions) with high opportunity.
Peak flows	ML	ML	M	NAA	Not much storage capacity or retention due to slope, some microdepressions, but infiltration line adds water.
Downstream erosion	ML	ML	M	NAA	“
General habitat	L	M	M	MOD	Increased structure, area and ponding (previously hayed pasture).
Invertebrates	L	M	-	MOD	Vegetation structure
Amphibians	L	L	-	NAA	Due to lack of water depth
Anadromous fish	NA	NA	NA	NA	Not fish habitat
Resident fish	NA	NA	NA	NA	Not fish habitat
Wetland assoc. birds	L	ML	-	MIN	
Wetland assoc. mammals	L	L	-	NAA	
Native plant richness	L	ML	-	MIN	
Primary prod/export	ML	M	-	MIN	

*Pre-P. = pre-potential of the site to perform a function; Poten. = current potential of the site to perform a function; Oppor. = opportunity of the site to perform function; Contri. = contribution of mitigation activities to the performance of a function.

*NA = Not Applicable; L = Low; ML = Moderately low; M = Moderate; MH = Moderately high; H = High.

*NAA = Not at all contributing; MIN = Minimal contribution; MOD = Moderate contribution; HI = High contribution.

Summary of Functions

- *Water Quality* – Moderate potential, Minimal contribution
- *Water Quantity* – Moderately low potential, No contribution
- *General Habitat* – Moderate potential, Moderate contribution

Overall Rationale

This project resulted in impacts to 1.76 acres of EM wetlands. The mitigation activities resulted in the enhancement of 3.11 acres of wetlands (0.9 acres of which may be new wetland created as a result of the increase in water levels from the infiltration line). Including the 0.9 acres of potentially new wetland, there would be a net loss of 0.86 acres (1.76 acres impacted – 0.9 acres of new wetland) of wetlands. The mitigation activities resulted in a minimal contribution to water quality functions on-site, due mainly to a potential increase in wetland area (0.9 acres) and increased area of seasonal inundation. The minimal increase in water quality functions did not compensate for the increased need for water quality treatment as a result of the development activities and loss of the total wetland area on-site. The mitigation activities did not have any contribution to water quantity functions.

The project did potentially improve fish and wildlife habitat functions as an out-of-kind exchange for the functions lost. Several culverts and dams were removed. The fisheries improvements, in addition to the moderate contribution to wildlife habitat, provided by the wetland enhancement

activities compensated for some of the lost wetland habitat functions. **It was determined that the project marginally or SOMEWHAT compensated for the impact.**

Overall Success and Possible Factors Correlated with Success

This enhancement project was considered to be **MINIMALLY SUCCESSFUL** (the project somewhat achieved the ecologically relevant measures and somewhat compensated for the impacts). The main factors that could have determined the outcome of this project are listed below.

Contributed to success

- Irrigation for the first couple of years;
- Consultant follow-up and monitoring; and
- Agency follow-up.

Did not contribute to success

- Marginal wetland hydrologic regime;
- An infiltration line supplementing the hydrologic regime which limits the long term sustainability of the site; and
- Poor wetland plant stock.

Was the mitigation site the same HGM and Cowardin class(es) as the impacts?

The mitigation site was on-site and of the same HGM type as the adjacent lost wetland area, however the presence of an infiltration line, which supported the site's water regime, resulted in an atypical HGM type. The mitigation site also exchanged Cowardin classes. The lost wetland area and the pre-enhancement wetland were both EM. Therefore, the mitigation activities resulted in an exchange of EM for SS wetlands. There was no information on the historical condition of the site; however the NWI Map indicated that the site was a PEM wetland.

Ecological Condition

Hydroperiods

This site had areas with seasonal inundation (> 1 month) and saturation (seldom inundated).

Dominance by Non-Native Plant Species

At the time of the site visit, non-native species dominated 1-24% of the cover within the wetland.

Plant Species Diversity

The SAT identified 36 native species and 10 non-native species on this site.

Buffers

At the time of the site visit, this site had a moderately high quality buffer (100m of forest, scrub, relatively undisturbed grassland or open water around at least 50% of the wetland).

Corridors and Connectivity

At the time of the site visit, this site had high connectivity and corridors to other habitat areas (the site is part of a riparian corridor > 50m wide connecting 2 or more wetlands within 1km with at least 30% forest or shrub cover).

Land Uses

Within 1 km of the wetland mitigation area the land uses were as follows: 19% developed (3% high density residential, 2% low density residential, and 13% urban/commercial), 19% undeveloped forests, and 63% agriculture.

Impact Information

This project, implemented by a public entity, is located in King County. It entailed the filling of 0.07 acres of wetlands under a Corps NWP 26. The wetlands lost were FO, seasonally flooded depressional outflow. They were a small central part of a larger FO and SS wetland system that extended off of the project site. This wetland system was considered Class 2 under the King County Sensitive Areas Ordinance.

Dominant vegetation and water source

Vegetation was dominated by ALRU with THPL, TSHE, and POTRI in the overstory. Dominant shrubs included ACCI, RUSP, and PYFU. LYAM, CAOB, and ATFI dominated the herbaceous layer; however the groundcover was sparse, especially in areas inundated for a long duration.

The water regime consisted of seasonal inundation and saturation as a result of the collection of surface run-off within topographic lows. The wetlands were adjacent to a tributary that flows into a lake and were above the headwaters of a sub-basin.

Functions provided

According to a Corps MFR, the quality of the wetland was considered high. The wetland system had the potential to perform flood storage, provide water quality improvements, provide relatively pristine and undisturbed habitat for wildlife, and had the capability to minimize damage to downstream areas.

Wetland Mitigation Required/Implemented

This project required the creation of 0.14 acres of wetlands on-site. The *goal* of the mitigation plan was:

- For the mitigation to mature into a seasonally flooded, forested wetland similar to the surrounding area.

The water regime and vegetation was intended to match adjacent areas. Placement of a pipe under the development was required to maintain hydrologic connectivity between the wetland areas.

Major mitigation actions included:

1. Excavation; and
2. Planting.

Excavation was completed in June and was adjusted from the original design in order to leave existing conifers and large downed logs. Salvaged topsoil (muck and silt loam) was directly replaced. Salvaged LYAM were also replaced. Other plantings consisted of containerized trees and shrubs, and CAOB sprigs. All plants were spaced to fit the landscape and the inundation/saturation regime. Planting occurred in August, and plants were irrigated once. An adjacent water quality pond supplements the groundwater supplied water regime. Water monitoring stations were in place for several years prior to mitigation actions. The site was then monitored post-construction to ensure hydrologic and vegetative success. No maintenance or contingency actions were necessary.

Site Assessment Information

This site was approximately 3 years old at the time of the site visit. The SAT identified approximately 0.13 acres of created wetland. This is within the 10% margin of error for acreage establishment. The site was a seasonally flooded, depressional outflow, EM wetland with an upland forest overstory.

Vegetation was dominated by LYAM, OESA, GLEL, and CAO (pre-existing upland forest overstory was dominated by ALRU, ACMA, TSHE, and THPL).

Wildlife observations included: a mountain beaver, Douglas squirrel and a tree frog.

The site was considered to be a Category 3 (14 points) wetland according to the WA State Wetland Rating System for Western Washington (see footnote 1 p. 3).

Site Evaluation Results

Did the mitigation project achieve the ecologically relevant measures?

1. The mitigation project established the acreage (within 10%) for the required mitigation activity (0.13 acres established/0.14 acres required). **YES**
2. This project had three performance standards (P.S.):
 - Two of the P.S. were assessed during Phase 2;
 - One of the assessed P.S. was attained (50%);
 - One of the assessed P.S. was considered to be significant; and
 - The significant P.S. was attained (100%).

Therefore, this project attained the significant P.S. **YES**

3. This project did not fulfill its goal, because the site has not matured into a seasonally flooded, forested wetland, and based on current conditions, it will not do this in the foreseeable future. However, this goal was judged to be inappropriate, because the small size of the creation area and the existing canopy would inhibit forested wetland development. **NA**

Based on the above, **the mitigation was determined to be ACHIEVING the ecologically relevant measures.**

Phase 1 comparison – This mitigation project was determined to not be built to plan in Phase 1. Planting and grading were not as indicated on the plan drawings. Of the three P.S., one out of one (100%) of the P.S. assessed using the Phase 1 methods were met. In Phase 2 the same standard was not attained but was not considered significant. This project was determined to be somewhat in compliance in Phase 1.

Did the mitigation project adequately compensate for the impacts?

The following table provides an overview of the results from the function assessment evaluations. The scores from the function assessment models for depressional wetlands could not be used due to the small size (< 0.25 acres) of the mitigation area. Therefore, the potentials were determined based on the data/characteristics collected on the function assessment forms rather than the calculated scores.

FUNCTION	Pre-P.	Poten.	Oppor.	Contri.	Comments
Sediments	NA	M	M	HI	
Nutrients	NA	M	M	HI	
Metals/toxic organics	NA	M	M	HI	Thin layer of bentonite?
Peak flows	NA	ML	M	MOD	
Downstream erosion	NA	ML	M	MOD	
General habitat	NA	ML	M	MOD	
Invertebrates	NA	ML	-	MOD	
Amphibians	NA	L	-	MIN	
Anadromous fish	NA	NA	NA	NA	Not fish habitat
Resident fish	NA	NA	NA	NA	Not fish habitat
Wetland assoc. birds	NA	L	-	MIN	
Wetland assoc. mammals	NA	L	-	MIN	
Native plant richness	NA	M	-	HI	
Primary prod/export	NA	M	-	HI	

*Pre-P.= pre-potential of the site to perform a function; Poten. = current potential of the site to perform a function; Oppor. = opportunity of the site to perform function; Contri. = contribution of mitigation activities to the performance of a function.

*NA = Not Applicable; L = Low; ML = Moderately low; M = Moderate; MH = Moderately high; H = High.

*NAA = Not at all contributing; MIN = Minimal contribution; MOD = Moderate contribution; HI = High contribution.

Summary of Functions

- *Water Quality* – Moderate potential, High contribution
- *Water Quantity* – Moderately low potential, Moderate contribution
- *General Habitat* – Moderately low potential, Moderate contribution

Overall Rationale

This project resulted in a 0.07 acre impact to a portion of a high quality FO headwater wetland. Though this was a very small impact, it bisected the existing forested wetland, thereby diminishing the overall functioning of the whole system due to habitat fragmentation. The functions and overall quality of the mitigation would, therefore, need to be of a higher quality in order to adequately compensate for this type of impact. In this case, the 0.13 acre created wetland did not provide the same functions as those lost, rather it exchanged functions, including EM for FO. The SET judged that this exchange only somewhat compensated for the impact. **It was determined that the project SOMEWHAT compensated for the impacts.**

Overall Success and Possible Factors Correlated with Success

This creation site was judged to be **MODERATELY SUCCESSFUL** (the project achieved the ecologically relevant measures and somewhat compensated for the impacts). The main factors that could have determined the outcome of this project are listed below.

Contributed to success

- Having a wetland biologist on-site full-time and available to make any necessary modifications to the plan to make it work, such as adjusting the plan to leave the existing mature trees and large woody debris (allow flexibility of design);
- Careful excavation;
- Hydrologic monitoring prior to implementation; and
- The use of salvaged hydric topsoils and plant material.

Did not contribute to success

- Site selection.

Was the mitigation site the same HGM and Cowardin class(es) as the impacts?

The mitigation site was on-site and of the same HGM subclass (depressional outflow) as the lost wetlands. The mitigation activities resulted in an exchange of Cowardin Class, FO for EM wetlands that have a pre-existing upland forest overstory.

Ecological Condition

Hydroperiods

This site had areas with seasonal flooding or inundation (> 1 month) and saturation (seldom inundated).

Dominance by Non-Native Plant Species

At the time of the site visit, non-native species dominated 0% of the cover within the wetland.

Plant Species Diversity

The SAT identified 38 native species and 4 non-native species on this site.

Buffers

At the time of the site visit, this site had a moderately high quality buffer (100m of forest, scrub, relatively undisturbed grassland or open water around at least 50% of the wetland).

Corridors and Connectivity

At the time of the site visit, this site had high connectivity and corridors to other habitat areas (the site is connected to a corridor > 50m wide with > 30% cover of forest or shrub).

Land Uses

Within 1 km of the wetland mitigation area the land uses were as follows: 44 % developed (29% high density residential and 15% low density residential), 56% undeveloped (43% undeveloped forests and 13% other undeveloped areas), and 0% agriculture.

Impact Information

This project, implemented by a private entity, is located in Pacific County. It was a violation resulting in the filling of 0.24 acres of wetlands. The project was authorized under a Corps After-The-Fact Nationwide 14 (road crossings) permit and Nationwide 18 (minor discharge) permit. The wetlands lost were several interdunal, SS (0.14 acres) and EM (0.10 acres), seasonally saturated to inundated, depressional wetlands, which were part of a larger dune and swale mosaic. There was no wetland rating available for the lost wetlands.

Dominant vegetation and water sources

The wetland delineation did not specifically describe the lost wetlands, but described the total of on-site wetlands. These wetlands, ranging in size from 0.008 acres to 3.41 acres, totaled 4.41 acres. They ranged from open herbaceous pocket-like wetlands in the younger dune areas to older shore pine, spruce/willow/sedge and rush wetlands of much larger size. They were interdunal swales, or hollows, which were saturated to inundated as the water table rose seasonally. Young *Pinus contorta* and PISI were dominant along the edge. SAHO was common in the wetter central areas as well as along the fringes, and *Myrica californica* was an occasional edge species. CAOB, JUAC, JUFA, and LOCO were typical herbaceous species.

Functions provided

According to a function analysis done for this project, which generally followed functional value criteria developed for the Corps, the wetlands did not rank high for any functions mainly due to their small size, isolated location, and lack of complex structure. The smaller wetlands rated low for every function except water quality, where they were rated low to moderate. This was based on future development, which may create point sources of pollution. The wetlands would be well suited to handle such point sources. Two wetlands rated medium for habitat because several vegetative layers provided many niches for wildlife and help attenuate local flooding and storm damage. The largest delineated wetland had a high degree of interspersed, mixing of different vegetative types, and a relatively high edge-to-area ratio.

The USFWS commented that the wetlands, including the dune formations and upland vegetation, perform important physical and biological functions. These included: a regionally rare habitat mosaic; a noise, visual and spatial buffer to wildlife from nearby human disturbances; foraging, cover, and potential reproductive habitat for wildlife; surface water collection and filtration; and reservoirs for freshwater. They were concerned that the dune formations and associated wetland swales are becoming increasingly rare mosaic habitat types.

Ecology expressed the following concerns at the time of the WQC issuance:

“...the dune environment includes a mosaic of dunes and swales and it is unrealistic to think that we can improve upon this system by removing sand from dunes down to the level of the swales. In this setting, the upland dunes are as important as the swales and one should not be sacrificed as compensation for the other. In the future, it is unlikely that Ecology would accept this type of mitigation for wetland impacts in dune areas.”

Also of concern was the transitory (by winds and shifting sand) nature of these areas.

Wetland Mitigation Required/Implemented

This project required the creation of 0.30 acres of wetlands on-site. The mitigation site was to be deemed successful if:

- At the end of the monitoring period, two randomly-selected meter square quadrats in the created wetland had overall species coverage within 10% of each of two randomly-selected meter square quadrats in existing interdunal wetlands within a quarter mile of the site; and
- Plant species composition was made up of desirable wetland species as opposed to invasive dune grasses or other upland types.

Major mitigation actions included:

Excavation.

The mitigation site was excavated to the depth of the groundwater table in the late summer/early fall. The groundwater table was to support the water regime seasonally. The original plan also consisted of planting native shrubs (*Salix* spp., *Myrica californica*, and *Pinus contorta*) along the edges and PISI in natural clusters on upland islands within the site. However, no plants were installed on the site; it was left to naturally revegetate.

Note: The mitigation site was part of a larger (2.5 acre) creation site that the applicant wanted to use as a mitigation bank for possible future projects. Ecology indicated that the use of the additional mitigation area for any future development proposals would be evaluated on a case by case basis. Monitoring of the entire created area was required for 3 years.

Site Assessment Information

This site was approximately 6(+) years old at the time of the site visit. The SAT identified approximately 0.30 acres of created wetlands (0.27 acres of EM and 0.03 acres of SS). This is within the 10% margin of error for acreage establishment. The site was a dunal/depressional closed (it relies on a seasonally high groundwater table with no surface water outlet), EM wetland.

Vegetation was dominated by CAOB and POAN. Within the next couple of years there will most likely be a *Salix* spp. dominated SS component.

Wildlife observations included: red-legged frogs, song sparrows, barn swallow, and an unidentified fish.

The site was considered a Category 3 (11 points) wetland according to the WA State Wetland Rating System for Western Washington (see footnote 1 p. 3).

Site Evaluation Information

Did the mitigation project achieve the ecologically relevant measures?

1. The mitigation project established the acreage (within 10%) for the required mitigation activity (0.3 acres established/ 0.3 acres required); **YES**
2. This project did not have any performance standards (P.S.); and **NA**
3. The project fulfilled the appropriate goals and objectives. The plant composition of the mitigation site closely mimicked adjacent dunal wetland systems. **YES**

Based on the above, **the mitigation was determined to be ACHIEVING the ecologically relevant measures.**

Phase 1 comparison – This mitigation project was determined to be not built to plan in Phase 1. Native shrubs were not planted according to plan, but rather the site was allowed to naturally revegetate. During the Phase 1 study we did not find evidence that this was an approved change to plan. There were no P.S. (NA) for this mitigation project. This project was determined to be not in compliance in Phase 1.

Did the mitigation project adequately compensate for the impacts?

The SET was unable to quantitatively assess the potential and opportunity for this site to perform functions because functions have not been modeled for dunal wetland systems. Due to our limited knowledge of functions associated with interdunal wetland systems, it was concluded, based on the vegetation structure, soils, and hydrologic indicators, that this site was performing “characteristic” functions of other natural wetlands in the primary dune area.

Overall Rationale

This project resulted in a 0.24-acre impact to a variety of interdunal wetlands in different successional stages from EM primary interdunal wetland to SS/FO tertiary interdunal wetland. Interdunal wetlands are a unique system of swales between upland sand dunes paralleling the ocean, becoming more mature and vegetatively more complex further from the ocean. Though these complex systems are not fully understood, it is generally acknowledged that the alternating wet swale and upland dune are both vital to the functioning of this system. The created wetland excavated upland dunes to create a 0.30-acre contiguous primary interdunal wetland. The mitigation project provided the same functions as those associated with the lost primary interdunal wetlands, but not the functions of the more mature wetlands. In addition, there was a temporal loss of structure. **It was determined that the project SOMEWHAT compensated for the impacts.**

Overall Success and Possible Factors Correlated with Success

This creation project was considered **MODERATELY SUCCESSFUL** (the project achieved the ecologically relevant measures and somewhat compensated for the impacts). The main factors that could have determined the outcome of this project are listed below.

Contributed to success

- Baseline hydrologic monitoring to determine how deep to excavate; and
- Good site location, which allowed for natural revegetation.

Did not contribute to success

- Mitigation design (did not replicate the upland / wetland mosaic naturally found in this area and the more mature secondary and tertiary dunal systems that were lost).

Was the mitigation site the same HGM and Cowardin class(es) as the impacts?

The mitigation site was on-site and of the same HGM type as the lost wetlands. However, it is important to note that there may be different functions associated with the primary dune versus the secondary dune versus the tertiary dune wetlands. The mitigation activities resulted in a temporary exchange of Cowardin Class, SS for EM wetlands. Shrubs were established over 0.03 acres, but were not tall enough over most of the site to be counted as SS at this time. However, a larger SS area will most likely develop within the next few years.

Ecological Condition

Hydroperiods

This site had areas with seasonal inundation (> 1 month) and occasional inundation (< 1 month).

Dominance by Non-Native Plant Species

At the time of the site visit, non-native species dominated 0% of the cover within the wetland.

Plant Species Diversity

The SAT identified 25 native species and 2 non-native species on this site.

Buffers

At the time of the site visit, this site had a moderate quality buffer (100m of forest, scrub, relatively undisturbed grassland or open water around at least 25% of the wetland).

Corridors and Connectivity

At the time of the site visit, this site had moderate connectivity and corridors to other habitat areas (the site is connected to a corridor 25-50m wide with > 30% cover of forest or shrub).

Land Uses

Within 1 km of the wetland mitigation area the land uses were as follows: 23% developed (9% high density residential, 9% low density residential, and 13% urban/commercial), 76% undeveloped (12% undeveloped forests and 64% other undeveloped areas), and 1% agriculture.

Impact Information

This project, implemented by a private entity, is located in Pierce County. It entailed the filling of 1.49 acres of wetlands under a Corps NWP 26. There was an extensive process of site design and alternative analyses so as to reduce the lost wetland acreage from 2.73 acres. The lost wetlands were PEM marsh and PSS seasonally flooded/saturated depressional wetlands. The files for this project had limited information on the lost wetlands, particularly the acreage of different Cowardin vegetation classes impacted. There was no wetland rating available for the lost wetlands.

Dominant vegetation and water sources

Dominant vegetation included SPDO, AGST, RARE, and HOLA, with isolated occurrences of several *Carex* spp., several *Juncus* spp., and several *Veronica* spp.

The wetland determination indicated that the unmaintained condition of the adjacent drainage ditch contributed to backing up more water and consequently created larger wetlands on-site than would otherwise be the case if the ditch was still functional and not silted in. Therefore, proper ditch maintenance may reduce the extent of wetlands on-site. The wetland determination also stated that the wet meadows on-site, especially those on the western half were marginal because of their seasonal hydroperiod (“The amount of precipitation that falls in a given year would determine whether or not these areas would be dominated by facultative or wetter species. Only the small, shallow depressions that pockmark the terrain where Kapowsin soils are found may tend to remain wetland in character, regardless of rainfall levels”).

Functions provided

Based on a qualitative rating the overall wetland functions and values of the site were determined to be: hydrologic support (low-moderate), storm and flood water alteration (low-moderate), water quality improvement (low-moderate), groundwater exchange (low), and biological support (moderate).

Wetland Mitigation Required/Implemented

This project required the creation of 1.12 acres of SS and EM wetlands and the enhancement of 1.4 acres of EM marsh, for a total of 2.52 acres of on-site wetland mitigation required. Other required mitigation included the preservation of 0.26 acres of mature Douglas fir buffer and enhancement of 1.30 acres of upland buffer. The *goal* of the mitigation plan was:

- To compensate for unavoidable wetland losses by constructing an enhanced and created wetland that would provide equal functions and values, particularly wildlife habitat.

Specific *objectives* were:

- To enhance 1.40 acres of existing EM and SS wetlands by planting a mix of wetland trees and shrubs;
- To create 1.12 acres of EM and SS wetlands from existing uplands by regrading and vegetating these areas;
- To establish a total of 1.56 acres of SS and FO buffer habitat around the wetland mitigation area;
- To protect mitigation areas by placing them in protected areas comprised of a total of 4.08 acres and install 44 signs delineating area restrictions;

- To enhance wildlife habitat by increasing structural and species diversity in the mitigation areas;
- To construct the elements of the mitigation plan with a minimum of disturbance to existing mature upland forested buffers;
- To maintain all remaining existing and created wetlands on-site, as defined by 1987 Corps methodology;
- To improve wildlife habitat for small birds and mammals and increase storm and floodwater attenuation through the improvement and creation of FO, SS, and EM wetland communities.

One of the main objectives of the plan was to improve wildlife habitat, especially for small birds and mammals. The proposed Cowardin classification was PEM and PSS wetlands with a seasonally saturated water regime.

Prior to the implementation of the mitigation activities the mitigation area consisted of a mixture of wetland and upland pasture grasses and dense shrubs and several small stands of mature Douglas fir trees (it was a degraded wetland similar to those filled).

Major mitigation actions included:

1. Clearing and grading;
2. Removal of undesirable exotic plant species;
3. Installation of wildlife habitat features; and
4. Preservation of upland native plant communities.

Planting within three wetland classes to blend with the existing vegetation was planned, including emergent (SCMI, JUEN, SPEM), scrub-shrub (SASC, COSE, and PHYCAP), and upland SS and FO. Grading was completed in the summer and planting in the fall. Planting substitutions were made to better fit on-site conditions.

The goal for the water regime was to maintain seasonal saturation similar to the existing conditions with some localized areas of inundation. The southeastern corner of the site has a locally perched groundwater condition as a result of a relatively impermeable glacial till horizon (Kapowsin soils). The main water source for the rest of the site was to be precipitation, resulting in seasonal inundation/saturation.

Monitoring was required for 5 years. Six monitoring plots were set up to determine vegetation condition and survival, non-native and invasive species, nest box condition and use, and wetland area.

There were various changes to the plans for this site. However, due to lack of a complete file for this project, we were unable to determine some of the final mitigation requirements.

Note: Off-site mitigation was also required by the county since the acreage available on-site was determined to be inadequate. This included 3.06 acres of enhancement, 1.82 acres of creation, and buffer area enhancement. This was not included in our evaluations. Though, the off-site mitigation was not required by the Ecology or the Corps, it was considered when determining the permit conditions associated with the project.

Site Assessment Information

This site was approximately 5 years old at the time of the site visit. The SAT identified approximately 2.03 acres (1.4 acres of enhancement acreage and 0.63 of creation acreage) of wetlands on-site. This is not within the 10% margin of error for acreage establishment. For this

site, it was difficult to determine the boundary of the “creation” acreage vs. the “enhancement” acreage vs. the “buffer” acreage. In this case, we determined that, of the total acreage we mapped on-site, they enhanced the required acreage and the rest was creation. Due to lack of information on the pre-enhancement condition, it was difficult to determine how much the mitigation activities actually “enhanced” the site. According to the June 1999 delineation for the Final Mitigation Monitoring Report, there were three wetland areas totaling 1.8 acres, which included a “stormwater pond,” and 1.8 acres of buffer. We did not include the on-site “stormwater pond” as part of the mitigation acreage.

According to the SAT, there were two different wetland sites. One of which was a depressional outflow SS and EM wetland and one of which was a depressional closed SS and EM wetland.

Vegetation was dominated by grasses (*Agrostis* spp., ANOD, HOLA, FERU), RARE, JUEF, POTRI, and ALRU. In excavated areas TYLA and CAOB dominated.

Wildlife observations included: tree frogs, tadpoles of at least one other frog species, song sparrow, red-wing black-bird, common yellow-throat, red-breasted nuthatch, mallards, willow flycatcher, American crows.

Site 1 was considered a Category 3 (19 points) wetland and Site 2 was considered a Category 3 (8 points) wetland according to the WA State Wetland Rating System for Western Washington (see footnote 1 p. 3).

Site Evaluation Results

Did the mitigation project achieve the ecologically relevant measures?

1. The mitigation project did not establish the acreage (within 10%) for the required mitigation activity (2.03 acres established / 2.52 acres required). **NO**
2. This project had four performance standards (P.S.):
 - Three of the P.S. were assessed during Phase 2;
 - All of the assessed P.S. were attained (100%);
 - Two of the assessed P.S. were considered to be significant; and
 - All of the significant P.S. were attained (100%).

Therefore, this project attained the significant P.S. **YES**

3. This project fulfilled the appropriate goals and objectives aside from the acreage requirement noted above. The goal, which was to compensate for unavoidable wetland impacts by constructing an enhanced and created wetland that would provide equal functions and values, particularly wildlife habitat, was met because it was determined that the mitigation activities adequately compensated for the impacts (see below). The rest of the objectives were being met. There are currently FO, SS and EM communities on the site and the activities at least had a minimal contribution to wildlife habitat. **YES**

Based on the above, **the mitigation area was determined to be SOMEWHAT achieving the ecologically relevant measures.**

Phase 1 comparison – This mitigation project was determined to be built to plan in Phase 1. Of the four P.S. for this mitigation project only three could be assessed with the Phase 1 methods. One of the three (33%) P.S. was met at the time of the Phase 1 site visit. Two of the P.S. were considered to be significant and were attained in Phase 2, including the one that was not attained in Phase 1. This project was determined to be somewhat in compliance in Phase 1.

Did the mitigation project adequately compensate for the impacts?

The following tables provide an overview of the results from the function assessment evaluations. The pre-potential of the sites to perform functions was based on the physical description of the characteristics and structure of the wetland prior to the enhancement activities (on a portion of the site) and relied on expert knowledge to determine the level of functioning. This was done using the approach for decision-making (see footnote 2 p. 5).

For Area 1, the potential of the site to perform functions was based on the scores from the function assessment model for depressional outflow wetlands.

FUNCTION	Pre-P.	Poten.	Oppor.	Contri.	Comments
Sediments	L	M	H	HI	This site was a mixture of creation and enhancement so
Nutrients	L	ML	H	MOD	a portion of the site was previously
Metals/toxic organics	L	M	H	HI	not performing wetland functions at all. The wet area
Peak flows	L	ML	H	MOD	was doubled as a result of the
Downstream erosion	L	M	H	HI	mitigation activities (creation).
General habitat	L	M	L	MIN	
Invertebrates	L	M	-	MOD	
Amphibians	L	ML	-	MIN	
Anadromous fish	L	L	L	NAA	
Resident fish	L	L	L	NAA	No permanent water?
Wetland assoc. birds	L	ML	-	MIN	
Wetland assoc. mammals	L	L	-	NAA	No permanent water?
Native plant richness	L	ML	-	MIN	
Primary prod/export	MH	MH	-	NAA	No change

*Pre-P. = pre-potential of the site to perform a function; Poten. = current potential of the site to perform a function; Oppor. = opportunity of the site to perform function; Contri. = contribution of mitigation activities to the performance of a function.

*NA = Not Applicable; L = Low; ML = Moderately low; M = Moderate; MH = Moderately high; H = High.

*NAA = Not at all contributing; MIN = Minimal contribution; MOD = Moderate contribution; HI = High contribution.

For Area 2, the potential of the site to perform functions was based on the scores from the function assessment model for depressional closed wetlands.

FUNCTION	Pre-P.	Poten.	Oppor.	Contri.	Comments
Sediments	ML	H	L	MOD	
Nutrients	L	M	H	HI	
Metals/toxic organics	L	M	H	HI	
Peak flows	M	H	M	MOD	
Downstream erosion	M	H	M	MOD	
General habitat	L	L	L	MIN	Not NAA because it is not representative of the other species specific habitat functions.
Invertebrates	L	ML	-	MIN	
Amphibians	L	L	-	NAA	No change
Anadromous fish	NA	NA	NA	NA	
Resident fish	NA	NA	NA	NA	
Wetland assoc. birds	L	ML	-	MIN	
Wetland assoc. mammals	L	L	-	NAA	No change
Native plant richness	L	ML	-	MIN	
Primary prod/export	NA	NA	-	NA	Closed system – not applicable

Summary of Functions for Area 1

- *Water quality* – Moderate potential, High contribution,
- *Water quantity*– Moderate potential, High contribution
- *General Habitat*– Moderate potential, Minimal contribution

Summary of Functions for Area 2

- *Water quality* – Moderately high potential, High contribution
- *Water quantity*- High potential, Moderate contribution
- *General habitat* – Low potential, Minimal contribution

Overall Rationale

This project resulted in impacts to 1.49 acres of EM and SS wetlands. The mitigation activities resulted in the enhancement of 1.4 acres of pre-existing wetlands and the creation of 0.63 acres of wetlands. Overall the mitigation activities resulted in a moderate to high contribution to water quality and quantity functions and a minimal contribution to wildlife habitat functions. Functions (including wildlife habitat) associated with a large wetland/upland mosaic were lost in exchange for higher structural diversity in a smaller area than the wetland area was before. Aside from the moderate to high contribution to water quality and quantity functions on this site, additional mitigation acreage in the form of creation and enhancement was required off-site to make up for the area and functions lost as a result of the on-site project impacts. **It was determined that the mitigation project COMPENSATED for the impacts.**

Overall Success and Possible Factors Correlated with Success

This mixed activity project was considered **MODERATELY SUCCESSFUL** (the project somewhat achieved the ecologically relevant measures and adequately compensated for the impacts). The main factors that could have determined the outcome of this project are listed below.

Contributed to success

- Good oversight and involvement by the same consultant;
- Irrigation;
- Plant substitutions allowed during replanting based on assessment of site conditions and plant survival;
- Maintenance;
- Follow-up by agencies; and
- Addition of soil amendments.

Did not contribute to success

- Site selection (marginal hydrology and in an urban location); and
- Failed to establish required acreage.

Was the mitigation site the same HGM and Cowardin class(es) as the impacts?

The mitigation sites were on-site and of the same HGM class (depressional) as the lost wetlands. The mitigation activities probably provided the same Cowardin Classes as the lost wetlands. However, we were not able to include this project in the Cowardin Class analysis because we did not have enough information on the acreages of different Cowardin classes on the impact sites and the pre-enhancement areas.

Ecological Condition

Hydroperiods

Site 1 had areas with seasonal flooding and inundation (> 1 month), saturation (seldom inundated) and an intermittent stream. Site 2 had areas with seasonal inundation (> 1 month) and saturation (seldom inundated).

Dominance by Non-Native Plant Species

At the time of the site visit, non-native species dominated 25-49% of the cover within both wetland areas.

Plant Species Diversity

The SAT identified 45 native species and 24 non-native species on Site 1 and 16 native species and 10 non-native species on Site 2.

Buffers

At the time of the site visit, both sites had low quality buffers (have paved roads within 25m around at least 5% of the wetland).

Corridors and Connectivity

At the time of the site visit, neither site had any corridors or connections to other habitat areas.

Land Uses

Within 1 km of the wetland mitigation area the land uses were as follows: 62% developed (30% high density residential, 12% low density residential, and 20% urban/commercial), 24% undeveloped (16% undeveloped forests and 8% other undeveloped areas), and 14% agriculture.

Impact Information

This project, implemented by a private entity, is located in King County. It entailed filling 17.4 acres of wetlands under a Corps Individual Section 404 (Clean Water Act) Permit. There were 20 seasonally saturated wetlands that consisted of 17.1 acres of PEM (wet pasture), and 0.3 acres of PSS. The wetlands were all rated as Category 3 using the WA State Wetland Rating System for Western WA (see footnote 1 p. 3).

Dominant vegetation and water sources

Vegetation in the EM wetlands consisted of *Agrostis* spp., HOLA, ALPR, FEAR, AGRE, and DAGL, *Juncus* spp., RARE, and other herbaceous plants. PHAR dominated some areas with TYLA dominating inundated depressions. The SS wetland area was dominated by RUDI and COSE.

Most of the lost wetlands were depressional outflow systems, though some wetlands on-site were depressional closed. Water sources included; precipitation, on-site-generated runoff, runoff from adjacent wetlands off-site, right-of-way slopes from adjacent roadways, backwater effects from a creek during high-intensity storms, and groundwater.

Functions provided

The lost wetlands were considered to provide relatively low function performance due to the disturbed and degraded condition from decades of agricultural use and encroaching development. The wetlands had the potential to provide: flood storage, water quality improvement, and wildlife habitat for small mammals, raptors, songbirds, and over-wintering waterfowl. Using WET, the wetlands rated Low to Medium for most functions, although in comparison with other wetlands in this agricultural and urbanized drainage, they ranked relatively high for non-fish habitat and water quality improvement.

Wetland Mitigation Required/Implemented

This project required a total of 56.5 acres of off-site wetland mitigation on two sites. This included 1.5 acres of creation, 9.2 acres of restoration, and 45.8 acres of enhancement. There were two mitigation sites for this project. For the purposes of this study they were called Site W and Site E. The overall *goal* of the mitigation plan was:

- To offset the impacts and achieve no net loss of wetland functions.

Specific *goals* were:

- To create, restore, and enhance habitat for fish and waterfowl (specifically blue-winged teal);
- To increase storage capacity for water runoff;
- To enhance water quality in an on-site stream by moderating water temperatures and improving dissolved oxygen levels in the creek;
- To create suitable habitat for raptor prey species and, temporarily shorebirds;
- To create quality habitat for herpetofauna; and
- To restore diverse native wetland plant communities.

The *objectives*, overall, were:

- To achieve a net gain in wetland functions within 5 years; and
- To have qualitatively higher functions by the end of the 15-year monitoring period.

The wetland mitigation was proposed to be:

- 5.9 acres POW (1.3 – Site W, 4.6 – Site E);
- 4.1 acres PAB (0.3 – Site W, 3.8 – Site E);
- 17.7 acres PEM (6.6 – Site W, 11.1 – Site E); and
- 28.8 acres PSS/PFO (16.9 – Site W, 11.9 – Site E).

Major mitigation actions included:

1. Extensive excavation to lower grades to intercept groundwater and re-contour the site;
2. Planting;
3. Recontouring stream banks and re-vegetating the riparian zone; and
4. Installation of habitat features, including bird boxes, log structures, root wads, snags and woody debris piles.

Grading was completed in the summer. Plants were installed during fall/winter in 3 phases (each phase about 2 years apart). Planting locations were modified in the field due to hydrologic conditions and plant substitutions were made due to lack of availability.

Pre-Mitigation Areas

Both mitigation sites had previously been in agricultural use. Site W had: 22.5 acres of PEM wetland with monotypic stands of PHAR over half of the site, and the remaining area included patches of SCMI, RARE, JUEF, CAOB; 1.1 acres of PSS dominated by *Salix* spp., ALRU, and POTRI; and 1.5 acres of upland dominated by pasture grasses *Agrostis* spp., FEAR, and AGRE.

Site E had been managed for livestock grazing and had: 22.2 acres of PEM wetland dominated by *Agrostis* spp., HOLA, ALPR, and RARE with the wettest areas dominated by PHAR, ALGE, and JUEF; 9.2 acres were upland pasture dominated by *Agrostis* spp., FEAR, and AGRE with one boundary of the site dominated by RUDI.

Prior to mitigation activities wetland functions were rated as low to moderate. The most important functions previously provided were flood storage, improving water quality through uptake of nutrients by dense herbaceous vegetation, and limited wildlife habitat.

There was no wetland rating for the enhancement areas prior to mitigation activities. The water comes from surface, near-surface lateral flow, and groundwater discharge. The wetlands retain floodwater and conserve groundwater discharge. Shallow groundwater keeps the soils saturated throughout the growing season in the wetter areas of the project sites. The HGM class prior to mitigation activities was described as marginally riverine on Site W, and depressional outflow on Site E.

There is a 5-year maintenance contract, which includes watering, weeding, and trash removal. Monitoring is required over a 15-year period in years 1, 2, 3, 5, 7, 10, and 15, to look at vegetation, water regime, fauna, development of habitat structure, water quality, and buffers.

Site Assessment Information

The two sites for this mitigation project were approximately 4 years old at the time of the site visit. The SAT identified 55.33 acres (25.44 for Site W, 29.89 for Site E), including 45.8 acres of enhancement, 9.2 acres of restoration and 0.33 acres of creation. This is within the 10% margin error for acreage establishment. For this site, it was difficult to determine the boundary of the “creation” acreage vs. the “enhancement” acreage vs. the “restoration” acreage. In this case, we determined that, of the total acreage we mapped on-site, they enhanced and restored the required

acreage and the rest was creation, since the enhanced area and restored area were previously delineated as pre-existing or historic wetlands.

There are two mitigation areas for this project:

- Site W was a depressional outflow SS (7.87 acres), EM (16.8 acres), and OW / AB bed (0.77 acres) wetland. This site was dominated by PHAR, *Salix* spp. (especially on the eastern portion of the site). JUEF, SCMI, TYLA, and RARE dominated the western portion of this site along with miscellaneous trees and shrubs. This site was considered to be a Category 2 (40 points) wetland according to the WA State Wetland Rating System for Western Washington (see footnote 1 p. 3).
- Site E was a depressional outflow/riverine impounding SS (3.29 acres), EM (14.35 acres), and OW / AB wetland (12.25 acres). This site was dominated by PHAR, TYLA, JUEF, RARE, and *Salix* spp. The deep OW areas were dominated by *Nuphar* spp., *Potamogeton* spp., and other aquatic bed species. This site was considered to be a Category 2 (32 points) wetland according to the WA State Wetland Rating System for Western Washington (see footnote 1 p. 3).

Wildlife observations included: marsh wren, song sparrow, raccoon scat (Site W) and bullfrogs, small unknown fish, coots, snipe, common yellow throat, red-wing blackbirds, marsh wren, and an osprey fishing (Site E).

Site Evaluation Results

Did the mitigation project achieve the ecologically relevant measures?

1. The mitigation project established the acreage (within 10%) for the required mitigation activities (55.33 acres established / 56.5 acres required). **YES**
2. This project had 25 performance standards (P.S.):
 - Ten of the P.S. were assessed during Phase 2;
 - Five of the assessed P.S. were attained (50%);
 - All five of the assessed P.S. were considered significant; and
 - All of the significant P.S. were attained (100%).

Therefore, this project attained the significant P.S. **YES**

3. The project somewhat fulfilled the appropriate goals and objectives. The mitigation area does not have as much PSS/PFO as was proposed. They are meeting the water regime goals, and most of the wildlife habitat goals, but they are not meeting the native plant diversity goals, due to the continued dominance of PHAR over much of both sites. **SOMEWHAT**

Based on the above, **the mitigation was determined to be SOMEWHAT achieving the ecologically relevant measures.**

Phase 1 comparison – This mitigation project was determined to be built to plan in Phase 1. Of the 26 P.S. for this mitigation project, four could be assessed with the Phase 1 methods. None (0%) of the P.S. were being met at the time of the Phase 1 site visit. Those four P.S. were evaluated for Phase 2 and were not considered significant. (Note: There were only 25 P.S. for this site in Phase 2. One P.S. was eliminated with approval of the appropriate agencies). This project was determined to be somewhat in compliance in Phase 1.

Did the mitigation project adequately compensate for the impacts?

The following tables provide an overview of the results from the function assessment evaluations. The pre-potential of the sites to perform functions was based on the physical description of the characteristics and structure of the wetland prior to mitigation activities and relied on expert

knowledge to determine the level of functioning. This was done using the approach for decision making (see footnote 2 p. 5).

For Site W, the potential of the site to perform functions was based on the scores from the function assessment model for depressional outflow / riverine impounding wetlands.

FUNCTION	Pre-P.	Poten.	Oppor.	Contri.	Comments
Sediments	M	MH	H	MOD	Dense EM vegetation, slow flows
Nutrients	ML	M	H	MOD	No organic soil
Metals/toxic organics	M	MH	H	MOD	Attach to sediments
Peak flows	ML	M	H	MOD	Not much storage
Downstream erosion	ML	M	H	MOD	Not much storage, no woody veg.
General habitat	ML	MH	M	MOD	Lack of structure, interspersion
Invertebrates	ML	MH	-	MOD	No standing H2O, low habitat niche diversity
Amphibians	ML	M	-	MIN	Seasonal ponding not of long enough durations, H2O level fluctuations too great
Anadromous fish	ML	M	H	MOD	High temp., low structural diversity
Resident fish	M	MH	-	MIN	Not as temp. sensitive
Wetland assoc. birds	ML	M	-	MIN	Some OW for over winter (limited food), not summer
Wetland assoc. mammals	ML	M	-	MIN	No denning structures, some food
Native plant richness	L	ML	-	MIN	PHAR dominated
Primary prod/export	M	H	-	MOD	PHAR dominated but stays on-site

*Pre-P. = pre-potential of the site to perform a function; Poten. = current potential of the site to perform a function; Oppor. = opportunity of the site to perform function; Contri. = contribution of mitigation activities to the performance of a function.

*NA = Not Applicable; L = Low; ML = Moderately low; M = Moderate; MH = Moderately high; H = High.

*NAA = Not at all contributing; MIN = Minimal contribution; MOD = Moderate contribution; HI = High contribution.

For Site E, the potential of the site to perform functions was based on the scores from the function assessment model for depressional outflow wetlands. Note: There are two pre-potentials listed on the table. Significant portions of the site were wetland before and other portions were created or restored from upland. The created or restored areas did not have the potential to perform wetland functions prior to the mitigation activities (NA), whereas some functions were already being performed in the areas that were enhanced.

FUNCTION	Pre-P.	Poten.	Oppor.	Contri.	Comments
Sediments	NA/ML	MH	H	HI	Some ponding, veg. structure
Nutrients	NA/ML	M	H	MOD	No organic soils
Metals/toxic organics	NA/ML	MH	H	HI	Some ponding, veg. structure
Peak flows	NA/ML	M	H	MOD	No impounding
Downstream erosion	NA/ML	M	M	MIN	“
General habitat	NA/L	MH	M	HI	Degraded pasture before
Invertebrates	NA/L	MH	-	HI	“
Amphibians	NA/L	MH	-	HI	“
Anadromous fish	NA/L	MH	L	MOD	“
Resident fish	NA/L	MH	-	HI	“
Wetland assoc. birds	NA/L	MH	-	HI	“
Wetland assoc. mammals	NA/L	M	-	MOD	“
Native plant richness	NA/L	M	-	MOD	“
Primary prod/export	NA/ML	MH	-	MOD	“

Summary of Functions for Area W

- *Water quality* - Moderately high potential, Moderate contribution
- *Water quantity*- Moderate potential, Moderate contribution
- *General habitat*- Moderately high potential, Moderate contribution

Summary of Functions for Area E

- *Water quality*- Moderately high potential, High contribution
- *Water quantity*- Moderately high potential, Moderate contribution
- *General habitat*- Moderately high potential, High contribution

Overall Rationale

This project resulted in impacts to 17.4 acres of degraded EM wetlands. The mitigation activities resulted in the enhancement of 45.8 acres, restoration of 9.2 acres and creation of 0.33 acres of wetlands. The mitigation activities provided a high or moderate contribution to water quality, water quantity and general habitat functions, thereby resulting in a net increase in wetland functions. Therefore, the mitigation activities have replaced the functions lost and, in addition to, provided anadromous fish habitat in exchange for functions lost (raptor habitat). **It was determined that this mitigation project adequately COMPENSATED for the impacts.**

Overall Success and Possible Factors Correlated with Success

This enhancement project was considered **MODERATELY SUCCESSFUL** (the project somewhat achieved the ecologically relevant measures and adequately compensated for the impacts). The main factors that could have determined the outcome of this project are listed below.

Contributed to success

- Good site selection (soils and hydrology in place), plan and oversight;
- Incorporation of an existing watershed plan;
- Experienced contractor;
- Constant maintenance (irrigation, weed control); and
- A program manager (the same person) to follow the project through to completion
→daily oversight of the construction for quality control.

Did not contribute to success

- Dominance by PHAR.

Was the mitigation site the same HGM and Cowardin class(es) as the impacts?

Site W is depressional outflow and riverine impounding whereas the impacts were to depressional outflow and depressional closed wetlands. Site E is a depressional outflow wetland that has exaggerated morphology/profile. It is an atypical HGM subclass for the landscape position. So the mitigation areas are somewhat the same HGM subclasses as the impacts. The impacts were mostly to PEM wetlands with some PSS impacts. The mitigation areas consist of PEM, PSS, and POW/AB. The mitigation areas therefore have a greater number of Cowardin classes than the impacts. A total of 13.55 acres of EM wetland was converted to SS or OW / AB.

Ecological Condition

Hydroperiods

Both sites had areas with saturation (seldom inundated). Site W had areas with permanent flooding and inundation, seasonal flooding and inundation (> 1 month) and also had a permanent stream. Site E had areas with permanent inundation, seasonal inundation (> 1 month) and also had an intermittent stream.

Dominance by Non-Native Plant Species

At the time of the site visit, non-native species dominated 50-75% of the cover within Area W and 25-49% of the cover within Area E.

Plant Species Diversity

The SAT identified 48 native species and 26 non-native species on Site W and 52 native species and 20 non-native species on Site E.

Buffers

At the time of the site visit, both sites had a moderate quality buffer (100m of forest, scrub, relatively undisturbed grassland or open water around at least 25% of the wetland).

Corridors and Connectivity

At the time of the site visit, Site W had high connectivity and corridors to other habitat areas (the site is part of a riparian corridor > 50m wide with > 30% cover of forest or shrub) and Site E had moderate connectivity and corridors to other habitat areas (the site is connected to a relatively undisturbed corridor greater than 50m wide to an undisturbed upland or open water that is > 10ha).

Land Uses

Within 1 km of Site W the land uses were as follows: 35% developed (15.5% high density residential, 1% low density residential, and 18.5% urban/commercial), 63% undeveloped (10% undeveloped forests and 53% other undeveloped areas), and 2% agriculture.

Within 1 km of Site E the land uses were as follows: 42% developed (12.5% high density residential, 1% low density residential, and 28.5% urban/commercial), 55% undeveloped (10% undeveloped forests and 45% other undeveloped areas), and 3% agriculture.

Impact Information

This project, implemented by a public entity, is located in King County. It entailed the filling of 1.2 acres of wetlands under a Corps Individual Section 404 (Clean Water Act) permit. There were several different wetlands lost, including 0.08 acres of PFO and 1.12 acres of PEM wetlands. There was no wetland rating available for the lost wetlands and very little description of the functions provided by them.

Note: A temporary easement also resulted in impacts to 0.07 acres of PFO and 0.64 acres of PEM wetlands. These were rectified immediately following construction and were not evaluated by the Phase 2 study.

Wetland Mitigation Required/Implemented

This project required 1.6 acres of wetland mitigation. 1.4 acres of the mitigation was originally called creation, however while digging exploratory soil pits, peat soils were discovered at 1-2.5 feet, according to a 1988 Geotechnical Report (this was determined after project approval). Therefore, mitigation activities in that area were considered restoration. The remaining 0.2 acres of wetland mitigation was enhancement. In addition, a 50 foot buffer (approximately 0.50 acres) was also required. The *goals and objectives* of the mitigation plan were:

- To provide for no net loss of wetland values as a result of development;
- To protect biological productivity and wildlife habitat in the created wetland;
- To simulate Pacific Northwest native plant community species in terms of composition, cover-abundance, and structure;
- To restore appropriate soil, topographic, and hydrologic conditions along the construction corridor necessary for the natural recolonization by native vegetation of areas disturbed by construction;
- To re-establish the affected wetland plant communities that provide wildlife and fish habitat; and
- To re-establish the aesthetic value of an adjacent pond to adjacent residents.

There was also a description of the design features intended to achieve the implementation of each goal and objective. The proposed Cowardin classification was PFO (0.75 acres), PSS (0.25 acres), and PEM (0.40 acres).

Major mitigation actions included:

1. Lowering the elevation to match the grade of an adjacent forested wetland; and
2. Planting ACMA, CRDO, POTRI, PSME, TSHE, THPL, RUSP, *Salix* spp., COSE, PHYCAP, emergents and an applied seed mix.

The planting plan was adapted as a result of site conditions being different than anticipated. Plant locations were adapted as a result of 6-8" of inundation over the site. Excavation and grading were completed in September and October, and planting was done in early November. The wetland is hydrologically connected to both a small pond, located along the northern boundary of the site, and to a large forested wetland system to the east. Water was also introduced from a north-south ditch that ran along the eastern edge of the site.

Monitoring was required for years 1, 2, 4, 6, and 8 following construction to assess plant species composition and cover, development of wetland habitats and functions, survival rate of planted

plants, wildlife use, and changes in the site's soils. Contingency actions included invasive species (RUDI and PHAR) removal in response to the 6th year monitoring report.

Site Assessment Information

This site was approximately 7(+) years old at the time of the site visit. The SAT identified approximately 1.58 (1.38 acres of restoration and 0.2 acres enhancement) acres of wetland. This is within the 10% margin of error for acreage establishment. The site was a depressional outflow, SS (1.11 acres) and EM (0.47 acres) wetland. A portion of the SS component was close to being FO (>20 feet tall). Vegetation was dominated by TYLA, ELPA, SCCY, SCMI, PHAR, and LUPA in the herbaceous layer, while *Salix* spp., ALRU, and POTRI dominated the shrub layer. RUDI was also encroaching on the site.

Wildlife observations included: angry bald-faced hornets (OUCH!), tree frogs, long-toed salamander, common yellow throat, American robin, mallard, Stellar's jay, Western wood pee wee, barn swallow, and a black-capped chickadee.

This site was considered to be a Category 2 (27 points) wetland according to the WA State Wetland Rating System for Western Washington (see footnote 1 p. 3).

Site Evaluation Results

Did the mitigation project achieve the ecologically relevant measures?

1. The mitigation project established the acreage (within 10%) for the required mitigation activity (1.58 acres established / 1.6 acres required). **YES**
2. This project had four performance standards (P.S.):
 - Three of the P.S. were assessed during Phase 2;
 - Two of the assessed P.S. were attained (66%); and
 - None of the P.S. were considered to be significant (NA).

Therefore, an evaluation of the significant P.S. was not applicable (NA) for this site. **NA**

3. This project fulfilled the appropriate goals and objectives. This project provided no net loss of wetlands by providing 1.38 acres of restoration for 1.2 acres of lost wetlands. **YES**

Based on the above, **the mitigation was determined to be ACHIEVING the ecologically relevant measures.**

Phase 1 comparison – This mitigation project was determined to be built to plan in Phase 1. Of the four P.S. for this mitigation project, three could be assessed with the Phase 1 methods. Two (67%) out of the three P.S. were being met in Phase 1. The same two P.S. were attained in Phase 2. None of the P.S. were considered to be significant in Phase 2. This project was determined to be SOMEWHAT in compliance in Phase 1.

Did the mitigation project adequately compensate for the impacts?

The following table provides an overview of the results from the function assessment evaluations. The potential of the site to perform functions was based on the scores from the function assessment model for depressional outflow wetlands.

FUNCTION	Pre-P.	Poten.	Oppor.	Contri.	Comments
Sediments	NA	MH	M	HI	
Nutrients	NA	M	M	HI	Sediments
Metals/toxic organics	NA	MH	M	HI	
Peak flows	NA	ML	M	MOD	
Downstream erosion	NA	M	M	HI	Dense emergent vegetation
General habitat	NA	M	M	HI	
Invertebrates	NA	M	-	HI	
Amphibians	NA	ML	-	MOD	
Anadromous fish	NA	ML	L	MIN	Due to low opportunity
Resident fish	NA	ML	-	MOD	
Wetland assoc. birds	NA	M	-	HI	
Wetland assoc. mammals	NA	ML	-	MOD	
Native plant richness	NA	ML	-	MOD	
Primary prod/export	NA	H	-	HI	

*Pre-P. = pre-potential of the site to perform a function; Poten. = current potential of the site to perform a function; Oppor. = opportunity of the site to perform function; Contri. = contribution of mitigation activities to the performance of a function.

*NA = Not Applicable; L = Low; ML = Moderately low; M = Moderate; MH = Moderately high; H = High.

*NAA = Not at all contributing; MIN = Minimal contribution; MOD = Moderate contribution; HI = High contribution.

Summary of Functions

- *Water quality* – Moderately high potential, High contribution
- *Water quantity* – Moderate potential, Moderate contribution
- *General habitat* – Moderate potential, High contribution

Overall Rationale

This project resulted in impacts to 1.2 acres of PFO (0.08 acres) and PEM (1.12 acres). The mitigation project resulted in the restoration of 1.38 acres and the enhancement of 0.2 acres of wetlands. The mitigation activities resulted in a moderate to high contribution to wetland functions on this site. As a result, the mitigation has replaced the wildlife habitat functions of the lost wetland areas. The mitigation also provided water quality functions in addition to, or in exchange for, functions lost. The wetland mitigation activities also resulted in a slight net gain of wetland area and functions. **It was determined that this mitigation project adequately COMPENSATED for the impacts.**

Overall Success and Possible Factors Correlated with Success

This restoration project was considered **FULLY SUCCESSFUL** (the project achieved the ecologically relevant measures and adequately compensated for the impacts). The main factors that could have determined the outcome of this project are listed below.

Contributed to success

- Some follow-up and maintenance by applicant and regulators (contingency related to invasive control);
- Good site selection (adequate hydrology); and
- Same consultant throughout the mitigation process who was able to amend the planting plan to fit on-site conditions.

Did not contribute to success

- More frequent maintenance could have eliminated the need for contingency actions in year 6.

Was the mitigation site the same HGM and Cowardin class(es) as the impacts?

We had limited information on the HGM subclasses of the lost wetlands. Information from the files indicated that a few of them were most likely depressional outflow, while others were depressional closed. Since the mitigation wetland is depressional outflow, it was considered somewhat the same HGM subclass as the lost wetlands. The mitigation area was also somewhat the same Cowardin classification as the lost wetlands. The impacts were to PFO and PEM wetlands, whereas the mitigation area is PSS and PEM (0.2 acres of EM was converted to SS).

Ecological Condition

Hydroperiods

This site was seasonally flooded or inundated (>1 month).

Dominance by Non-Native Plant Species

At the time of the site visit, non-native species dominated 1-24% of the cover within the wetland.

Plant Species Diversity

The SAT identified 48 native species and 10 non-native species on the site.

Buffers

At the time of the site visit, this site had a moderate quality buffer (100m of forest, scrub, relatively undisturbed grassland or open water around at least 25% of the wetland).

Corridors and Connectivity

At the time of the site visit, this site had high connectivity and corridors to other habitat areas (the site is connected to a corridor > 50m wide with > 30% cover of forest or shrub).

Land Uses

Within 1 km of the wetland mitigation area the land uses were as follows: 80% developed (36% high density residential and 44% low density residential), 20% undeveloped (19% undeveloped forests and 1% other undeveloped areas).

Impact Information

This project, implemented by a public entity, is located in Snohomish County. It entailed the filling of 1.84 acres of wetlands under a Corps Individual After-The-Fact (ATF) permit (0.92 acres) and Individual permit request for additional fill (0.92 acres). The impacts were to PEM (1.78 acres) and POW (0.06 acres) depressional wetlands. The wetlands were determined to be Category 3 and 4 according to the Western WA State Wetland Rating System (see footnote 1 p. 3).

Several different small wetland areas were filled. The wetlands were historically disturbed by dike construction and associated ditching and draining.

Wetland types, locations, dominant vegetation and water sources

The dominant vegetation was PHAR. The delineated wetlands were divided into sections based on their locations. Section A and B wetlands were immediately adjacent to the toe of the dike. Area A-1 was at the toe of the slope in an apparent depression. All of the soils were imported and disturbed. Dominant vegetation was SODU, PHAR, LOCO, COSE, and SPDO. Area B-3 was located at the immediate toe of the slope, was saturated at 10" and was dominated by ALRU, COSE, SAPI, and SPDO. Area B-4 was located adjacent to the dike with ponding and saturation to the surface and was dominated by PHAR, JUEF and SAPI.

Wetlands that were filled in Section C appeared to have been created as a result of breakage in the dike during past flood events. Two wetlands were to be filled in this area one of which was dominated by PHAR, the second was dominated by PHAR and ALRU and had moist soils.

Wetlands filled in Section D were also associated with past breaks in the dikes. One of them was a depressional wetland dominated by PHAR and saturated to the surface. Another one was a ponded wetland used as a dump site. A third wetland was dominated by PHAR, JUEF, and TYLA. Finally part of an OW pond with a fringe of JUEF, TYLA, and PHAR was filled.

Functions provided

The functions provided by the nine impacted wetlands were assessed using the Oregon Freshwater Assessment Methodology, which rated them as follows: Wildlife-provides limited habitat; Fish habitat-ranged from no contribution to potentially contributing to fish habitat; Water quality-all had the potential to perform water quality functions; Hydrologic control-all had the potential to provide hydrologic control; Sensitivity to impact-all were potentially sensitive to impact; and Enhancement potential-ranged from potential for enhancement to little potential for enhancement.

The WADFW and USFWS expressed concern that the wetlands to be impacted had groundwater and culvert connections to a slough or the river and therefore provided numerous beneficial ecological functions to fish and wildlife resources in the area in addition to enhancing water quality.

Wetland Mitigation Required/Implemented

This project required the restoration of 1.97 acres and the enhancement of 3.78 acres of wetlands on-site (1.05 acres restoration and 3.45 acres of enhancement for the original fill and 0.92 acres of

restoration and 0.33 acres of enhancement for the additional fill). In addition, 1.25 acres of upland buffer enhancement was also required.

Pre-enhancement conditions

Prior to mitigation the enhancement area was PEM, persistent seasonally flooded Category 3 wetland. The remainder of the mitigation area was wetland in the distant past. A break in a dike caused the deposition of sandy loam material over the original hydric wetland soils. The mitigation site is within an estuary and immediately north of a large forested wetland complex. The site is within a level agricultural parcel that has been primarily used for hay and pasture (managed as pastureland). A large agricultural drainage ditch runs immediately along the eastern boundary of the mitigation site with a smaller one running along the southern edge. Sub-surface drain tile was present under much of the site. Existing vegetation included PHAR, HOLA, CIAR, and RUDI.

The *goals* of the mitigation plan were:

- To restore 1.97 acres of wetland and enhance 3.78 acres of wetland and to create within this area two vegetative classes and an open water component within a 5 year period, with a forested class being created within 10 years;
- To create the FO and SS wetland complex so that it is similar in composition to that found in the large forested wetland complex to the south (1994 mitigation plan); and
- To provide diverse wildlife habitat and contribute to fisheries habitat. As such, the site will be rated as a Class 2 wetland under the Ecology wetland rating system.

The proposed Cowardin classification was PFO, PSS, PEM and POW. Based on the Oregon Freshwater Assessment Methodology the mitigation site would provide for a net gain in wildlife and fisheries function with the water quality and hydrological control functions remaining unchanged.

Major mitigation actions included:

1. Removal of surface soils to expose the original wetland soils;
2. Planting of the area with native grasses, shrubs and trees;
3. Connecting the restoration site with the forested wetland to the south;
4. Removal of sub-surface drain tile;
5. Culvert placement; and
6. Removal of all excavated spoils to limit re-infestation of reed canary grass.

Grading activities were completed in the summer and planting was completed in the fall. Nursery and native cuttings were used as well as a seed mix containing *Agrostis* spp. and *Alopecurus* spp. The planned water source was precipitation and overland flow. The adjacent forested wetland, with its extensive peat soils, ensures a constant source of water via the existing drainage system. They placed a culvert in the ditch to cause some ponding and some surface saturation. Also, large woody debris was placed throughout the wetland as habitat features.

Maintenance actions included clearing grasses around existing planted trees and tagging of trees as to be better seen as well as mowing and herbicide application to control invasive species. Contingency actions included planting additional trees and shrubs due to the high failure rate, probably due to drought conditions. Monitoring was required for five years to determine plant survival, water quality, water depths, and wildlife use (birds, mammals, and amphibians).

Site Assessment Information

This site was approximately 3 years old at the time of the site visit. The SAT identified approximately 2.56 acres of wetland (1.97 acres were restored and 0.59 acres were enhanced). The rest of the area to be enhanced (3.19 acres) was mowed just prior to the site visit and no trees or shrubs were observed. Therefore, the mitigation activities implemented in this area did not result in the establishment of the required acreage for that mitigation activity. This is not within the 10% margin of error for acreage establishment. In addition, the SAT did not locate any of the required buffer plantings. The site was a depressional outflow, EM (2.12 acres) and AB (0.44 acres) wetland. The outflow was through a culvert >60 cm. A dike on the eastern side isolates the wetland from a tidally influenced slough.

Vegetation was dominated by TYLA, JUEF, PHAR, SPEM, JUAC, ELPA, and *Agrostis* spp in the EM areas. *Utricularia* spp., *Lemna* spp., *Potamogeton* spp., *Elodea* spp., and *Ceratophyllum* spp. were the dominant AB species.

Wildlife observations included: violet-green swallow, barn swallow, American goldfinch, song sparrow, marsh wren, European starling, willow flycatcher, common yellow throat, yellow breasted chat, house finch, bush tit, common snipe, American crow, and a long-tailed weasel. In the vicinity we also observed the following: Northern harrier, Great blue heron, Mallard, Stellar's jay, 2 adult and 2 fledging red-tail hawks, American robin, black-capped chickadee, Western wood pee wee, common raven. Also, noted beaver use in and around a culvert.

This site was considered to be a Category 2 (29 points) wetland according to the WA State Wetland Rating System for Western Washington (see footnote 1 p. 3).

Site Evaluation Results

Did the mitigation project achieve the ecologically relevant measures?

1. The mitigation project did not establish the acreage (within 10%) for the required mitigation activities (2.56 acres established / 5.75 acres required). **NO**
2. This project had nine performance standards (P.S.):
 - Five of the P.S. were assessed during Phase 2;
 - Three of the assessed P.S. were attained (60%);
 - Four of the assessed P.S. were considered to be significant; and
 - Two of the significant P.S. were attained (50%).

Therefore, this project somewhat attained the significant P.S. **SOMEWHAT**

3. This project somewhat fulfilled the appropriate goals and objectives. The site is a Class 2 EM wetland. However, the mitigation activities did not result in the establishment of PSS or PFO wetland areas. The applicant is required to do replanting in order to establish the SS areas as required. **SOMEWHAT**

Based on the above, **the mitigation was determined to be SOMEWHAT achieving the ecologically relevant measures.**

Phase 1 comparison – This mitigation project was determined to be built to plan in Phase 1. Of the nine P.S. for this mitigation project only one could be assessed with the Phase 1 methods. The P.S. involved the establishment of a certain area of SS vegetation, which the site was not meeting (0%). This same standard in Phase 2 was determined to be significant and was not being attained. This project was determined to be somewhat in compliance in Phase 1.

Did the mitigation project adequately compensate for the impacts?

The following table provides an overview of the results from the function assessment evaluations. The table provides function assessment information for the restoration area (1.97 acres) and a portion of the enhancement area (0.59 acres). The rest of the area to be enhanced (3.19 acres) was determined to have no contribution to the potential of the site to perform functions due to the fact that it is currently being mowed and no surviving plants were evident. The mitigation activities implemented in this area did not result in the establishment of the required acreage for that mitigation activity.

FUNCTION	Pre-P.	Poten.	Oppor.	Contri.	Comments
Sediments	NA	H	*H	HI	Constricted outlet, structure
Nutrients	NA	MH	*H	HI	*Cows
Metals/toxic organics	NA	H	M	HI	Organic soils, sediments high
Peak flows	NA	NA	NA	NA	H2O level controlled by pump
Downstream erosion	NA	NA	NA	NA	H2O level controlled by pump
General habitat	NA	M	H	HI	
Invertebrates	NA	M	-	HI	Higher if more strata
Amphibians	NA	M	-	HI	
Anadromous fish	NA	MH	**L	HI	**Tide gate, no access
Resident fish	NA	MH	-	HI	
Wetland assoc. birds	NA	M	-	HI	Higher if more structure in buffer, mudflats
Wetland assoc. mammals	NA	MH	-	HI	Steep banks for denning
Native plant richness	NA	M	-	HI	
Primary prod/export	NA	MH	-	HI	<i>Lemna</i> spp., invertebrates

*Pre-P. = pre-potential of the site to perform a function; Poten. = current potential of the site to perform a function; Oppor. = opportunity of the site to perform function; Contri. = contribution of mitigation activities to the performance of a function.

*NA = Not Applicable; L = Low; ML = Moderately low; M = Moderate; MH = Moderately high; H = High.

*NAA = Not at all contributing; MIN = Minimal contribution; MOD = Moderate contribution; HI = High contribution.

Summary of Functions for the restoration area (163r)

- *Water quality* – High potential, High contribution
- *Water quantity* – The water levels at this site are controlled by a water pump, therefore water quantity functions were not considered applicable to this site.
- *General Habitat* – Moderate potential, High contribution

Summary of Functions for the enhancement area (163e)

The mitigation activities on the enhancement area did not contribute to the potential of the site to perform any of the functions. The area was being mowed and therefore SS vegetation has not been established.

Overall Rationale

This project resulted in impacts to 1.84 acres (1.76 acres PEM, 0.06 acres POW) of Category 3 and 4 wetlands. The mitigation activities resulted in the restoration of 1.97 acres (1.53 acres of PEM, 0.44 acres of POW), which had a high contribution to the potential of the site to perform functions. The mitigation area replaced the water quality and wildlife habitat functions that were impacted at a ratio slightly greater than 1:1. A majority of the enhancement area had no contribution to the potential of the site to perform functions and was being mowed. Prior to enhancement the area was dominated by PHAR as it was during the site visit. Attempts to establish shrubs and trees in the enhancement area have not been successful. Though, a majority of the enhancement area provided no contribution to the potential of the site to perform functions, it is currently functioning as a wetland buffer for the restoration area. Despite the failure to

enhance the majority of the required acreage the restored wetland mitigation area provided a high contribution to the potential of the site to perform functions at a slightly greater than 1:1 ratio. **It was determined that this mitigation project adequately COMPENSATED for the impacts.**

Overall Success and Possible Factors Correlated with Success

This mixed activity project was considered **MODERATELY SUCCESSFUL** (the project somewhat achieved the ecologically relevant measures and adequately compensated for the impacts). The main factors that could have determined the outcome of this project are listed below.

Contributed to success

- Adequate water source;
- Excavation to hydric (peat) soils; and
- Biologist oversaw construction (allowed for use of woody debris found during excavation).

Did not contribute to success

- Lack of PHAR control;
- Lack of irrigation;
- Lack of establishment of shrubs;
- Mowing of enhancement and buffer area; and
- Inexperienced personnel doing the planting.

The consultant indicated that they had more success with the pioneer cuttings rather than the nursery container stock. Other thoughts included a need for interim P.S. for non-native species that could have triggered contingency actions prior to the end of the monitoring period.

Was the mitigation site the same HGM and Cowardin class(es) as the impacts?

The lost wetlands and the mitigation wetland were all the same depressional outflow HGM subclass. The area is diked. Historically it would have been influenced by the tides and the site would have functioned as a tidal system. The impacts were to wetlands that were a result of the creation of the dike and so are the mitigation wetlands. The site does not have exaggerated morphology. The mitigation wetland was also the same Cowardin classification as the lost wetlands. The impacts were to PEM, PAB/POW and the mitigation wetlands are the same.

Ecological Condition

Hydroperiods

The restoration area (163r) had areas with permanent flooding or inundation, seasonal flooding or inundation (> 1 month) and saturation (seldom inundated).

Dominance by Non-Native Plant Species

At the time of the site visit, non-native species dominated 25-49% of the cover within the restoration area (163r). The area that was to be enhanced (163e) is currently being mowed and no shrubs or trees have been established. Non-native species provide >75% cover in this area.

Plant Species Diversity

The SAT identified 43 native species and 11 non-native species on the restoration area.

Buffers

At the time of the site visit, this site had a moderate quality buffer (100m of forest, scrub, relatively undisturbed grassland or open water around at least 25% of the wetland).

Corridors and Connectivity

At the time of the site visit, this site had minimal connectivity and corridors to other habitat areas (the site is part of a riparian corridor > 5m wide with relatively undisturbed vegetation that extends for more than 1km).

Land Uses

Within 1 km of the wetland mitigation area the land uses were as follows: 32% developed (24% low density residential, and 8% urban/commercial), 40% undeveloped (26% undeveloped forests and 14% other undeveloped areas), and 28% agriculture.

Impact Information

This project, implemented by a private entity, is located in King County. It entailed the filling of 1.59 acres (1.26 acres of original fill and 0.33 acres of additional fill) of wetlands under a Corps NWP 26. The impacts were to PEM slope wetlands, which were part of a much larger system of FO slope wetlands on-site. The FO slope wetlands were generally associated with the bottom of steeply sloped ravines, while the impacted EM wetlands were generally less steep and had some SS areas scattered throughout. These wetlands were determined to be Type 2 under the city's Sensitive Areas Ordinance. The areas that were filled had been modified by farm practices since at least 1936. The land supported crops or was used as pasture until about the mid-1980's.

Dominant vegetation and water sources

Vegetation in the impacted wetland areas consisted primarily of PHAR.

Drainage on the entire site was in a west to east direction and was facilitated by several streams and other drainage pathways. These drainage features generally flowed through wetlands at the bottom of wooded ravines in the site's western portion and tended to break apart in the less steep EM areas in the eastern portion of the site. Numerous seeps along the steeper slopes tended to keep water flowing into the summer months. Saturation of soils at or near the surface was found in virtually all areas delineated as wetland.

Functions provided

According to the wetland delineation report, the wetlands filled functioned as follows: moderate-high for water quality, moderate-high to high for wildlife habitat, moderate for groundwater recharge, low-moderate for groundwater discharge, and moderate-high for stormwater retention.

Wetland Mitigation Required/Implemented

This project required the creation of 1.75 acres (1.25 acres for original fill and 0.50 acres for additional fill) and the enhancement of 1.57 acres (1.37 acres for the original fill and 0.20 acres for the additional fill) of wetlands on-site. 2.5 acres of buffer enhancement was also required.

The *goal* of the mitigation plan was:

- To protect, enhance, and enlarge existing wetlands to compensate for loss of wetlands due to filling and encroachment (for the additional fill the goal was to protect, enhance, and enlarge existing wetlands to compensate for filling 0.33 acres of wetland pasture dominated by monotypic PHAR).

The *objectives* included:

- The creation and enhancement of specific areas (more detailed information was provided in the files);
- Increasing plant species diversity; and
- Incorporating habitat features in the created and enhanced wetlands and their buffers.

The proposed Cowardin classification was PEM and PSS. There were two main areas where mitigation activities were implemented (Area S and Area G). Prior to enhancement, Area G was dominated by PHAR.

Major mitigation actions included:

1. Creation and enhancement of EM and SS wetland between three existing "finger" slope wetlands to create a larger, more diverse wetland system (Area S);

2. Excavation of shallow depressions in the existing PHAR dominated wetland (Area G);
3. Planting of all areas and placement of habitat features (snags, stumps, downed logs, bird nesting boxes and bat roosting boxes) throughout the mitigation areas.

The mitigation areas consisted of a complex series of drainages.

Monitoring was required for five years to monitor vegetation, wildlife use, water quality and hydrology. Maintenance measures that have been implemented, include thinning of ALRU, control and eradication of exotic and invasive weeds by hand grubbing whenever possible, pruning along trails and boardwalk, repair and winterization of the temporary irrigation system, and regular clean out of storm drains and catch basins due to silt transport/deposition from upstream and accumulation of autumn leaf matter and debris.

There was no consultant questionnaire completed for this project.

Site Assessment Information

This site was approximately 3 years old at the time of the site visit. The SAT identified approximately 4.31 acres (2.56 acres of enhancement and 1.75 acres of creation) of wetland. This is within the 10% margin of error for acreage establishment. The additional acreage of enhancement may have been buffer acreage.

There are two mitigation areas for this project:

- The southern area (Area S) consisted of a series of depressions-in-slope with water flowing through weirs and riprap channels from one pond to another and eventually through a single outlet. This area consisted of 0.17 acres of FO and/or SS, 0.25 acres of EM, and 0.30 acres of OW/AB. This site was considered to be a Category 2 (24 points) wetland according to the WA State Wetland Rating System for Western Washington (see footnote 1 p. 3).
- The other area (Area G) also consisted of a series of depressions-in-slope with water flowing through weirs and riprap channels from one pond to another and eventually through a single outlet. This area consisted of 2.56 acres of FO/SS, 0.67 acres of EM, and 0.36 acres of OW/AB. Vegetation was dominated by a dense overstory of *Salix* spp. and ALRU with a PHAR understory. TYLA and SCMI were dominant in the more open EM areas. This site was considered to be a Category 2 (27 points) wetland according to the WA State Wetland Rating System for Western Washington (see footnote 1 p. 3).

Wildlife observations included tree frogs, bullfrogs, mallard ducks, hooded mergansers (Phase 1), and a gadwall (Phase 1).

Site Evaluation Results

Did the mitigation project achieve the ecologically relevant measures?

1. The mitigation project established the acreage (within 10%) for the required mitigation activities (4.31 acres established / 3.32 acres required). **YES**
2. This project had three performance standards (P.S.):
 - All three of the P.S. were assessed during Phase 2;
 - Two of the assessed P.S. were attained (67%);
 - All three of the assessed P.S. were considered to be significant; and
 - Two of the significant P.S. were attained (67%).

Therefore, this project somewhat attained the significant P.S.

SOMEWHAT

3. The project somewhat fulfilled the appropriate goals and objectives. The intent of the project was to have EM and SS wetlands. The result of the mitigation activities was creation of OW, AB and SS either as a result of conversion of upland or conversion from EM. The mitigation activities resulted in increased plant diversity and enlargement of pre-existing wetlands. **SOMEWHAT**

Based on the above, **the mitigation was determined to be SOMEWHAT achieving the ecologically relevant measures.**

Phase 1 comparison- This mitigation project was determined to be built to plan in Phase 1. Of the five P.S. for this mitigation project, four (80%) out of five were assessed and being met in Phase 1. (Note: Based on new background information collected for Phase 2, it was determined that this site had three P.S., according to the most recent approved monitoring plan). This project was determined to be somewhat in compliance in Phase 1.

Did the mitigation project adequately compensate for the impacts?

The following tables provide an overview of the results from the function assessment evaluations for Areas S and G. The mitigation areas consisted of depressions-in-a-slope wetland. There are currently no function assessment models for slope wetlands or slopes with depressions. Therefore, the potentials were determined based on the data/characteristics collected on the function assessment forms rather than the calculated scores. The pre-potential of the site to perform functions was based on the physical description of the characteristics and structure prior to enhancement activities and relied on expert knowledge to determine the level of functioning. This was done using the approach for decision-making (see footnote 2 p. 5).

Area S

FUNCTION	Pre-P.	Poten.	Oppor.	Contri.	Comments
Sediments	L	MH	L	MOD	
Nutrients	L	M	M	MOD	Not much seasonal water
Metals/toxic organics	NA	M	L	MOD	
Peak flows	NA	ML	M	MOD	
Downstream erosion	NA	ML	M	MOD	
General habitat	ML	MH	M	MOD	
Invertebrates	L	MH	-	HI	Added ponds
Amphibians	NA	M	-	HI	
Anadromous fish	NA	NA	NA	NA	Not anadromous fish habitat
Resident fish	NA	M	-	HI	
Wetland assoc. birds	NA	M	-	HI	
Wetland assoc. mammals	NA	M	-	HI	
Native plant richness	L	M	-	MOD	
Primary prod/export	L	M	-	MOD	

*Pre-P. = pre-potential of the site to perform a function; Poten. = current potential of the site to perform a function; Oppor. = opportunity of the site to perform function; Contri. = contribution of mitigation activities to the performance of a function.

*NA = Not Applicable; L = Low; ML = Moderately low; M = Moderate; MH = Moderately high; H = High.

*NAA = Not at all contributing; MIN = Minimal contribution; MOD = Moderate contribution; HI = High contribution.

Area G

FUNCTION	Pre-P.	Poten.	Oppor.	Contri.	Comments
Sediments	*L	M	M	MOD	*Previously a slope wetland,
Nutrients	*L	M	M	MOD	added depressions trap
Metals/toxic organics	*L	M	M	MOD	sediments
Peak flows	**NA	L	M	MIN	**Previously not providing
Downstream erosion	**NA	L	M	MIN	**Previously not providing
General habitat	L	MH	M	HI	Went from PHAR dominated to high interspersions of classes and structure
Invertebrates	L	MH	-	HI	
Amphibians	L	M	-	MOD	
Anadromous fish	NA	NA	NA	NA	Not anadromous fish habitat
Resident fish	**NA	ML	-	MOD	**Previously not providing
Wetland assoc. birds	L	M	-	MOD	
Wetland assoc. mammals	L	M	-	MOD	
Native plant richness	L	ML	-	MIN	
Primary prod/export	ML	MH	-	MOD	

Summary of Functions for Area S

- *Water quality* – Moderate potential, Moderate contribution
- *Water quantity* – Moderately low potential, Moderate contribution
- *General habitat* – Moderately high potential, Moderate contribution

Summary of Functions for Area G

- *Water quality* – Moderate potential, Moderate contribution
- *Water quantity* – Low potential, Minimal contribution
- *General habitat* – Moderately high potential, High contribution

Overall Rationale

This project resulted in impacts to 1.59 acres of PHAR dominated EM slope wetlands. The mitigation activities resulted in the creation of 1.75 acres (a slight net gain of area) and the enhancement of an additional 2.56 acres of wetlands (some of which may have been a part of the required buffer). Both areas had FO/SS, EM, and OW/AB vegetation. In general, the mitigation activities provided a moderate contribution to functions. The mitigation areas replaced similar functions to those lost. In addition, the mitigation areas are providing wildlife habitat in the form of amphibian and waterfowl habitat that was not previously provided by the slope wetlands. **It was determined that this mitigation project adequately COMPENSATED for the impacts.**

Overall Success and Possible Factors Correlated with Success

This mixed activity project was considered to be **MODERATELY SUCCESSFUL** (the project somewhat achieved the ecologically relevant measures and adequately compensated for the impacts). The main factors that could have determined the outcome of this project are listed below.

Contributed to success

- Adequate water;
- Good oversight; and
- Maintenance and monitoring.

Did not contribute to success

- Compaction of the bermed areas precluded emergent vegetation growth.

Was the mitigation site the same HGM and Cowardin class(es) as the impacts?

The mitigation areas were not the same HGM subclass as the lost wetlands, which were slope wetlands. The mitigation consisted of some of the existing slope wetlands, however there are now depressions-in-slope, which is an atypical HGM type. The impacts were to PEM and the mitigation areas consist of PEM, POW, PAB, but mostly PSS. The mitigation activities resulted in an overall net loss of PEM (almost 2 acres of existing EM wetlands were converted to SS and OW areas) in exchange for the other Cowardin classes.

Ecological Condition

Hydroperiods

Both sites had areas with permanent inundation, occasional inundation (< 1 month) and saturation (seldom inundated). Area G also had areas of seasonal inundation (> 1 month).

Dominance by Non-Native Plant Species

At the time of the site visit, non-native species dominated 25-49% of the cover within Area S and 50-75% of the cover within Area G.

Plant Species Diversity

The SAT identified 44 native species and 14 non-native species on Area S and 25 native species and 11 non-native species on Area G.

Buffers

At the time of the site visit, both sites had a moderate quality buffer (100m of forest, scrub, relatively undisturbed grassland or open water around at least 25% of the wetland).

Corridors and Connectivity

At the time of the site visit, both sites had high connectivity and corridors to other habitat areas (the sites are connected to a corridor > 50m wide with > 30% cover of forest or shrub).

Land Uses

Within 1 km of Area S the land uses were as follows: 43% developed (10.5% high density residential, 15.5 % low density residential, and 17% urban/commercial), 26% undeveloped (19% undeveloped forests and 7% other undeveloped areas), and 31% agriculture.

Within 1 km of Area G the land uses were as follows: 32% developed (4% high density residential, 10% low density residential, and 18% urban/commercial), 29% undeveloped (19% undeveloped forests and 10% other undeveloped areas), and 39% agriculture.

Impact Information

This project, implemented by a public entity, is located in Snohomish County. It entailed the filling of 0.41 acres of wetlands under a Corps Nationwide Permit 23 (for Approved Categorical Exclusions). The wetlands lost were PFO, seasonally saturated riverine flow-through. The wetlands were rated as Category 2 FO riparian wetlands based on the fact that ALRU and POTRI (greater than 20 feet tall) comprised greater than 30% aerial cover. The wetlands also provided habitat for Cutthroat and Steelhead trout, priority fish species. Category 3 wetlands were also filled.

Dominant vegetation and water sources

Vegetation was dominated by ALRU, POTRI, ACMA, PSME, ACCI, PHYCA, RUSP, SARA, COSE and *Salix* spp. as well as RUDI and PHAR. The water table varied from a few ponded areas to 15 inches or less below the surface during the growing season. Wetlands on the eastern side of the creek functioned as an overflow channel for the creek during high water storm events.

Functions provided

The following functions and values were attributed to the wetlands: wildlife habitat, food chain support, biofiltration for stormwater runoff, sediment retention, flow storage, and flood attenuation.

Wetland Mitigation Required/Implemented

This project required the restoration of 0.82 acres of wetlands at three on-site areas. Buffer plantings were also required. The *goal* of the project was:

- To recreate a forested wetland and buffers that were similar in function to, and an extension of, adjacent wetlands and buffers bordering the creek.

More specific *objectives* of the mitigation plan were:

- To establish a native wetland plant community;
Create a wetland system that has vegetation structure and species diversity similar to the forested wetland system north of the restoration site.
- To establish a native buffer plant community; and
Create a buffer that has a species diversity and vegetation structure similar to a native lower Puget Trough ecoregion forest-edge plant community.
- To provide wildlife support.
Replace the limited invasive plant community at the wetland mitigation sites, and provide buffers by creating a more complex and varied vegetation community capable of supporting a diverse animal population of small mammals and songbirds, similar to that found in the adjacent wetland and upland areas.

Note: The permit required the restoration of 0.82 acres of wetlands. It was determined through our site evaluations that a majority of the mitigation activities did not result in the restoration of a former wetland system, but rather resulted in the enhancement of a degraded wetland system. Therefore, it was determined by delineation that the mitigation activities involved **0.27 acres of restoration and 0.65 acres of enhancement.**

The proposed Cowardin classification was PFO, seasonally saturated. An existing wetland to the north of the site was used as a reference site.

Major mitigation actions included:

1. Removal of fill material to the level of the native soil, tilling and scarifying compacted soils to retain moisture and promote plant growth;
2. Eradication of PHAR and RUDI by controlled application of “roundup” and mechanical removal; and
3. Planting POTRI, PSME, RUSP, COSE and a few SARA, PHYCAP, *Salix* spp., and SYAL.

Grading was completed in September and October, and plantings (bare root, container, and balled & burlapped) were installed in November and December. The planned water source was overflow from the creek and precipitation.

There was no record of maintenance or contingency actions implemented on this site. Following fill removal and planting, monitoring was required for a minimum of 5 years, to determine plant species cover, seasonal groundwater levels, and to photograph the site.

Site Assessment Information

This site was approximately 3(+) years old at the time of the site visit. Only one of the three mitigation areas had wetland hydrology in place. The SAT identified approximately 0.55 acres of established wetland enhancement acreage at one area. This is not within the 10% margin of error for acreage establishment. The site was a riverine flow-through SS (almost FO) wetland.

The two other areas that were to be restored did not show evidence of wetland characteristics. One area was essentially a gravel beach and was being eroded by the creek.

Vegetation at the enhancement area was dominated by ALRU, POTRI, and *Salix* spp. in the shrub layer. PHAR, *Agrostis* spp., and RUDI dominated the understory.

Wildlife observations included: American robin, American crow, song sparrow, black-capped chickadee, barn swallow, violet-green swallow, ruby-crowned kinglet, cedar waxwing, black-headed grosbeak, willow flycatcher, bushtits, Swainson’s thrush, rock dove, Wilson’s warbler, and a garter snake. Outside the wetland (<20m), wildlife observations included: Great blue heron, orange-crown warbler, olive-sided flycatcher, Stellar’s jay, belted kingfisher, American goldfinch, and a common raven.

This site was considered to be a Category 3 (14 points) wetland according to the WA State Wetland Rating System for Western Washington (see footnote 1 p. 3).

Site Evaluation Results

Did the mitigation project achieve the ecologically relevant measures?

1. The mitigation project did not establish the acreage (within 10%) for the required mitigation activity (0.55 acres established / 0.82 acres required). **NO**
2. This project had 10 performance standards (P.S.):
 - Three of the P.S. were assessed during Phase 2,
 - Two of the assessed P.S. were attained (67%),
 - None of the P.S. were considered to be significant.

Therefore, an evaluation of the significant P.S. was not applicable (NA) for this site. **NA**

3. This project did not fulfill the appropriate goals and objectives. **NO**

Based on the above, **the mitigation was determined to be NOT achieving the ecologically relevant measures.**

Phase 1 comparison-The mitigation project was determined to not be built to plan in Phase 1. This was primarily due to planting. We could not determine if the mitigation was graded to plan. Of the 10 P.S. for this project, zero out of two (0%) of the P.S. assessed using the Phase 1 methods were met. One of the P.S. could not be determined. This project was determined to be not in compliance in Phase 1.

Did the mitigation project adequately compensate for the impacts?

The following table provides an overview of the results from the function assessment evaluations. The information in the table below is for one of the three mitigation areas. The other two areas were not wetland, and therefore, the mitigation activities had no contribution to the potential performance of wetland functions. The potential of the site to perform functions was based on the scores from the function assessment models for riverine flow-through wetlands. The pre-potential of the site to perform functions was based on the physical description of the characteristics and structure of the wetland prior to the enhancement activities and relied on expert knowledge to determine the level of functioning. This was done using the approach for decision-making (see footnote 2 p. 5)

FUNCTION	Pre-P.	Poten.	Oppor.	Contri.	Comments
Sediments	ML	M	H	MOD	Low vegetation filtering, added stiffer structures.
Nutrients	ML	M	H	MOD	“
Metals/toxic organics	ML	M	H	MOD	“
Peak flows	ML	ML	H	NAA	
Downstream erosion	MH	MH	H	NAA	
General habitat	L	ML	M	MIN	
Invertebrates	L	ML	-	MIN	
Amphibians	L	L	-	NAA	
Anadromous fish	M	M	H	NAA	Provides high flow refuge (backwater effects)
Resident fish	L	L	-	NAA	
Wetland assoc. birds	ML	ML	-	NAA	
Wetland assoc. mammals	M	M	-	NAA	
Native plant richness	L	ML	-	MIN	
Primary prod/export	MH	MH	-	NAA	

*Pre-P. = pre-potential of the site to perform a function; Poten. = current potential of the site to perform a function; Oppor. = opportunity of the site to perform function; Contri. = contribution of mitigation activities to the performance of a function.

*NA = Not Applicable; L = Low; ML = Moderately low; M = Moderate; MH = Moderately high; H = High.

*NAA = Not at all contributing; MIN = Minimal contribution; MOD = Moderate contribution; HI = High contribution.

Summary of Functions

- *Water quality* – Moderate potential, Moderate contribution
- *Water quantity* – Moderate potential, No contribution
- *General habitat* – Moderately low potential, Minimal contribution

This summarizes the functions for the one enhancement area. The other two areas were not wetland, and therefore, the mitigation activities had no contribution to the potential performance of wetland functions.

Overall Rationale

This project resulted in the loss of 0.41 acres of PFO, Category 2 riparian wetlands. The mitigation activities resulted in the enhancement of 0.55 acres of PSS/PFO wetlands. The mitigation activities moderately improved the water quality functions already existing at the mitigation site. The mitigation activities did not compensate for the lost area or functions,

particularly wildlife habitat functions associated with the impact site. **It was determined that this mitigation project DID NOT adequately compensate for the impacts.**

Overall Success and Possible Factors Correlated with Success

This enhancement project was considered **NOT SUCCESSFUL** (the project did not achieve the ecologically relevant measures and did not adequately compensate for the impacts). The main factors that could have determined the outcome of this project are listed below.

Contributed to success

- Natural regeneration.

Did not contribute to success

- Lack of oversight, follow-up and implementation of contingency actions; and
- Limited experience of staff with mitigation projects.

Was the mitigation site the same HGM and Cowardin class(es) as the impacts?

The mitigation area was the same HGM subclass as the lost wetlands, which were riverine flow-through. However, the mitigation area is not the same Cowardin classification as the lost wetlands. FO wetlands were filled, and the mitigation area is currently SS. Note: it appeared as if a majority of the shrubs present were already existing shrubs and did not result from the mitigation activities.

Ecological Condition

Hydroperiods

This site had areas with occasional flooding (< 1 month) and saturation (seldom inundated).

Dominance by Non-Native Plant Species

At the time of the site visit, non-native species dominated 50-75% of the cover within the wetland.

Plant Species Diversity

The SAT identified 16 native species and 6 non-native species on this site.

Buffers

At the time of the site visit, this site had a moderate quality buffer (100m of forest, scrub, relatively undisturbed grassland or open water around at least 25% of the wetland).

Corridors and Connectivity

At the time of the site visit, this site had moderate connectivity and corridors to other habitat areas (the site is part of a riparian corridor 25-50m wide connecting to other wetlands with at least 30% shrub or forest cover in the corridor).

Land Uses

Within 1 km of the wetland mitigation area the land uses were as follows: 26% developed (high density residential), 54% undeveloped (42% undeveloped forests and 12% other undeveloped areas), and 20% agriculture.

Impact Information

This project, implemented by a private entity, is located in Grays Harbor County. It entailed the filling of 0.14 acres of wetlands under a Corps Individual Section 404 (Clean Water Act) permit. The impacts were to a tidally influenced PEM ditch wetland. There was no rating provided for the filled wetlands. The filled wetlands were connected on either end to large wetland areas associated with a river and its tributary. The ditch was interrupted by an existing site access road and culvert.

Dominant vegetation and water sources

Vegetation was dominated by PHAR, TYLA, LYAM, OESA, CAO, and EQAR in the EM areas. One end of the ditch was dominated by COSE and RUSP with an herbaceous layer of LYAM, JUEF, and OESA. The wetland receives road runoff and is subject to a high water table. The wetland is tidally influenced, however there is no salt intrusion.

Functions provided

Functions provided by the site included biofiltration and water conveyance. Functions were limited due to its small size, disturbed nature, and location within a developed area. There was a detailed county Wetland Inventory Data sheet which described the following functions: Water quality improvement = moderate; Flood/storm water control = moderate; Groundwater recharge = low; Natural Biological Support = low; and Erosion/Shoreline Protection = low.

Wetland Mitigation Required/Implemented

This project required 0.21 acres of wetland mitigation on-site. This included 0.09 acres of creation and 0.12 acres of enhancement. According to the delineation and mitigation report for this project, the *goal* of the mitigation was:

- To replace wetland functions lost through filling a portion of the wetland ditch.

Specific *goals* included:

- The creation of 3,790 square feet of wetland ditch; and
- The enhancement of 4,700 square feet of wetland ditch with native shrub species.

The proposed Cowardin classification was PEM and PSS. It was also intended that the wetland ditch provide biofiltration and water conveyance as well as increased habitat value (primarily to passerine birds). There was limited information available for the wetlands as they existed prior to enhancement activities.

Major mitigation actions included:

1. Overexcavating and grading the mitigation areas 12-18 inches below the final grade in order to intercept the groundwater table and use stockpiled wetland soils from the filled wetlands;
2. Supplementing the site with imported topsoil as necessary; and
3. Planting slough sedge in the created area and planting shrubs (ACCI and COSE-balled and burlapped, and *Salix* spp.-cuttings) in the enhancement area.

The wetland ditch is hydrologically connected to a slough through an existing culvert. Tidal action results in a reverse flow through the ditch and backup of water. Monitoring was required during construction and one year following implementation of the mitigation plan to ensure that wetland plant species were becoming established in the ditch areas. There was no evidence that maintenance or contingency actions were implemented at this site.

The Corps and Ecology conducted several site inspections. According to the Corps, the mitigation had been completed in accordance with the permit specifications. After a second inspection the Corps indicated that the project was in compliance and complete.

There was no consultant questionnaire completed for this project.

Site Assessment Information

This site was approximately 6 years old at the time of the site visit. The SAT identified approximately 0.26 acres (0.14 acres creation and 0.12 acres of enhancement) of wetland. This is within the 10% margin of error for acreage establishment. The site was a tidally influenced SS (0.15 acres) and EM (0.11 acres) ditch wetland connected to a slough via a channel. 0.12 acres of the SS existed prior to mitigation activities.

Vegetation was dominated by TYLA, CAST, SCMI, and OESA. Several Salix spp. dominated the shrub cover.

Wildlife observations included: a garter snake, and a common yellow throat.

The created portion of the site was considered to be a Category 3 (7 points) wetland according to the WA State Wetland Rating System for Western Washington (see footnote 1 p. 3). Note: This rating was only for the creation area. In the enhancement area we could not determine what was pre-existing and what resulted from the mitigation activities.

Site Evaluation Results

Did the mitigation project achieve the ecologically relevant measures?

1. The mitigation project established the acreage (within 10%) for the required mitigation activity (0.26 acres established / 0.21 acres required). **YES**
2. This project had one performance standard (P.S.):
 - The SAT was unable to assess this standard.

Therefore, an evaluation of the significant P.S. was not applicable (NA) for this site. **NA**

3. This project fulfilled the appropriate goals and objectives of the mitigation plan. The mitigation activities resulted in the creation and enhancement of the required acreage and the site is potentially performing the desired functions. The mitigation area is potentially providing biofiltration and conveyance and has greater vegetation structure, which provides increased habitat for passerine birds. **YES**

Based on the above, **the mitigation was determined to be ACHIEVING the ecologically relevant measures.**

Phase 1 comparison – It could not be determined whether the mitigation project was built to plan in Phase 1. Grading was completed according to plan, however whether plantings were installed according to plan could not be determined. In Phase 1 the one P.S. for the mitigation plan was assessed, however it was not met (0%). This project was determined to be not in compliance in Phase 1.

Did the mitigation project adequately compensate for the impacts?

The following table provides an overview of the results from the function assessment evaluations for the creation area only. The mitigation area is tidally influenced. There are currently no function assessment models for tidally influenced wetlands. Therefore, the potentials were

determined based on the data/characteristics collected on the function assessment forms rather than the calculated scores. This was done using the approach for decision-making (see footnote 2 p. 5).

FUNCTION	Pre-P.	Poten.	Oppor.	Contri.	Comments
Sediments	NA	H	H	HI	
Nutrients	NA	H	H	HI	
Metals/toxic organics	NA	H	H	HI	
Peak flows	NA	NA	NA	NA	Tidal system
Downstream erosion	NA	NA	NA	NA	Tidal system
General habitat	NA	ML	L	MIN	
Invertebrates	NA	ML	-	MOD	
Amphibians	NA	L	-	MIN	
Anadromous fish	NA	ML	H	HI	
Resident fish	NA	ML	-	MOD	
Wetland assoc. birds	NA	L	-	MIN	
Wetland assoc. mammals	NA	L	-	MIN	
Native plant richness	NA	ML	-	MOD	
Primary prod/export	NA	MH	-	HI	

*Pre-P. = pre-potential of the site to perform a function; Poten. = current potential of the site to perform a function; Oppor. = opportunity of the site to perform function; Contri. = contribution of mitigation activities to the performance of a function.

*NA = Not Applicable; L = Low; ML = Moderately low; M = Moderate; MH = Moderately high; H = High.

*NAA = Not at all contributing; MIN = Minimal contribution; MOD = Moderate contribution; HI = High contribution.

Summary of Functions

- *Water quality* – High potential, High contribution
- *Water quantity* - We know little about how tidally influenced systems perform water quantity functions, therefore we were unable to determine the potential of this site to perform water quantity functions (NA).
- *General habitat* – Moderately low potential, Minimal contribution

Overall Rationale

This project resulted in a 0.14 acre impact to a tidally influenced wetland ditch of low to moderate quality. The mitigation activities resulted in 0.14 acres of created wetlands and 0.12 acres of enhanced pre-existing wetlands. The functions and overall quality of the created wetland were, on average, moderate. The mitigation project provided the same functions as those lost as well as provided functions, particularly water quality functions, which were in addition to functions lost. The mitigation activities resulted in a 1:1 replacement of area and function. We could not evaluate the contribution of the enhancement area, however, the enhancement activities may have provided a contribution to already existing functions at that site. **It was determined that this mitigation project adequately COMPENSATED for the impacts.**

Overall Success and Possible Factors Correlated with Success

This creation project was considered **FULLY SUCCESSFUL** (the project achieved the ecologically relevant measures and adequately compensated for the impacts). The main factors that could have determined the outcome of this project are listed below.

Contributed to success

- Good site selection given the nature of the lost wetlands;
- Adequate water;
- Appropriate design; and
- Agency follow-up.

Did not contribute to success – No factors noted.

Note: Though this project was a mixture of creation and enhancement, the site assessment and evaluation focused on the creation area, and therefore, the project was considered creation in the Phase 2 results.

Was the mitigation site the same HGM and Cowardin class(es) as the impacts?

The mitigation area was the same HGM type as the filled wetland and was somewhat the same Cowardin classification. The filled wetland was EM (0.14 acres) and the mitigation area is EM (0.11 acres) and SS (0.03 acres new, 0.12 acres unchanged). There was a slight trade-off of more SS and less EM.

Ecological Condition

Hydroperiods

This site had areas with permanent flooding, seasonal flooding (> 1 month), occasional flooding (< 1 month), saturation (seldom inundated) and a permanent stream.

Dominance by Non-Native Plant Species

At the time of the site visit, non-native species dominated 25-49% of the cover within the wetland.

Plant Species Diversity

The SAT identified 29 native species and 14 non-native species on this site.

Buffers

At the time of the site visit, this site did not have a buffer (vegetated buffer less than 2m (6.6ft) for greater than 95% of the circumference around the site).

Corridors and Connectivity

At the time of the site visit, this site did not have any corridors or connections to other habitat areas.

Land Uses

Within 1 km of the wetland mitigation area the land uses were as follows: 25% developed (9% low density residential and 16% urban/commercial), 74% undeveloped (15% undeveloped forests and 59% other undeveloped areas), and 1% agriculture.

Impact Information

This project, implemented by a private entity, is located in Skagit County. It entailed the filling of 1.99 acres (0.66 acres of non-agricultural wetland and 1.33 acres of farmed wetland pasture (NRCS)) under a Corps NWP 26. The impacts were to PEM, depression outflow wetlands. The 0.66 acres of non-agricultural wetlands were considered Category 3 wetlands and the 1.34 acres of farmed wetland pasture, which was part of a larger (7.42 acre) wetland were considered Category 2 according to the WA State Wetland Rating System for Western Washington (see footnote 1 p. 3).

Dominant vegetation

Common plant species in the non-agricultural area included HOLA, JUEF, EQTE, PHAR, RARE, ANOD, *Agrostis* spp., *Alopecurus* spp., *Festuca* spp., and *Vicia* spp. The remainder of the project site supported agricultural fields used for forage production (*Festuca* spp., *Agropyron* spp., *Alopecurus* spp., and RARE). PYFU occurred sporadically throughout the site and a tree and shrub dominated community (POTRI, PREM, CRDO, *Rosa* spp., OECE, RHPU, SPDO, COSE, and LOIN) existed along the southern boundary.

Functions provided

The non-agricultural wetlands were located within agricultural fields used for the production of forage and offered little, if any, adjacent wildlife habitat. Wildlife habitat was limited to forage and cover for passerine birds, including American robins and barn swallows. The site did not provide significant habitat for amphibians and there was no evidence of use of the site by mammals. The other wetland area was generally mowed at least once a year, usually in late summer. Consequently, they offered some wildlife forage and cover value during the spring and early summer months. The wetlands provided groundwater recharge capabilities and some storage of surface waters. The biofiltration capabilities were limited due to a lack of surface water flow.

Wetland Mitigation Required/Implemented

This project required the enhancement of 6 acres of wetlands on-site. The enhancement area consisted of the remaining portions of the 7.42 acre Category 2 wetland mentioned above. Prior to enhancement the wetland supported non-native herbaceous plant species and was used for forage production. The *goal* of the mitigation plan was:

- To compensate for the functions lost as a result of the wetland fill.

To compensate for the loss of 2.0 acres of non-native facultative upland, facultative and facultative wetland grasses, the remaining 6 acres of wetland in the southern half of the project site was to be converted to habitat dominated by native woody wetland species. From both a structural and vegetative standpoint, the establishment of wetland forest and mixed wetland forest and mixed wetland forest/shrub plant communities throughout two-thirds of the remaining area of on-site jurisdictional wetland habitat was to provide an immediate increase in wildlife habitat on the entire project site. Additionally, the enhancement plantings were to accelerate the natural succession of native plants into the remaining two acres of jurisdictional wetland habitat which would not be directly planted as a result of this project.

The *goal of the project design* was:

- To minimize impacts to local hydrologic conditions in accordance with Ecology's Stormwater Management Manual for the Puget Sound Basin. The contribution of the project area to the maintenance of local hydrologic conditions, especially groundwater, was to be maintained by discharging all runoff from the housing project into the northern portion of the remaining on-site wetland habitat. This would allow distribution of surface water to on-site and adjacent off-site wetlands. Therefore, all project site runoff would continue to contribute to the local groundwater resource. Runoff from the project area was to be maintained at existing runoff rates for the 10-year and 100-year storm events and 50% of the 2-year event.

The *objective* of the proposed planting plan was:

- To establish four acres of PFO wetland and mixed PFO/PSS wetland plant communities similar to the communities found in the adjacent areas which are not in forage production.

The proposed Cowardin classification was PSS and PFO.

Major mitigation actions included:

1. Construction of biofiltration swales and dissipation facilities to treat stormwater runoff from the project site;
2. Establishment of a 12-foot wide berm with a weir along one side of the wetland to allow for stormwater detention within the wetland and subsequent discharge; and
3. Planting according to three different habitat types. Area 1 (wet mixed FO/SS wetland habitat) was planted with PISI, SASI, SASC, SALA, LOIN, COSE, and POTRI; Area 2 (mixed FO/SS wetland habitat) was planted with ROPI, ACCI, THPL, POTRI, CRDO, POTRE, AMAL, PHYCAP, and PYFU; Area 3 (FO wetland habitat) was planted with POTRI, ALRU, THPL, PYFU, and CRDO.

Planting locations were determined in the field to match local conditions to allow for differences in soil moisture and type. An area near the weir was left unplanted due to the depth of standing water to allow for self-colonization by EM vegetation or water tolerant woody species. The planned water source was direct precipitation and groundwater with on-site drainage generally flowing east and southeast toward a stream. Monitoring was required at two year intervals from 1996 to 2000 to assess hydrology, health and vigor of rooted stock, and provide photo documentation.

Problems on this site included vandalization (all the planted conifers were stolen out of the ground), refuse dumping and herbivory by mice.

Site Assessment Information

This site was approximately 3(+) years old at the time of the site visit. The SAT identified approximately 5.85 acres of wetland enhancement acreage. This is within the 10% margin of error for acreage establishment. The site was a depressional outflow SS (1.70 acres converted from EM) and EM (4.15 acres) wetland. The outflow for the wetland is through a weir, making this site an atypical HGM subclass. There are minimal buffers around the site. Vegetation was dominated by JUEF, RARE, CAOBS, VESC, ALGE, and PHAR in the EM areas. ALRU, SASI, SALU, POTRI, and COSE dominated the SS areas. Wildlife observations included: red-wing black bird, swallows, common snipe, muskrat, and tadpoles.

The site was considered to be a Category 2 (23 points) wetland according to the WA State Wetland Rating System for Western Washington (see footnote 1 p. 3).

Site Evaluation Results

Did the mitigation project achieve the ecologically relevant measures?

1. The mitigation project established the acreage (within 10%) for the required mitigation activity (5.85 acres established / 6 acres required). **YES**
2. This project had two performance standards (P.S.):
 - One of the P.S. was assessed during Phase 2;
 - All of the assessed P.S. were attained (100%); and
 - The one assessed P.S. was considered to be significant; and
 - The significant P.S. was attained (100%).

Therefore, this project attained the significant P.S. **YES**

3. This project fulfilled the appropriate goals and objectives. The project compensated for the functions lost as a result of the wetland fill and the site is on its way to meeting the objective of establishing 4 acres of PFO wetland and mixed PFO/PSS wetland plant communities (currently 1.7 acres). **YES**

Based on the above, **the mitigation was determined to be ACHIEVING the ecologically relevant measures.**

Phase 1 comparison – This mitigation project was determined to be built to plan in Phase 1. The two P.S. for this site could not be assessed by the Phase 1 methods. This project was determined to be in compliance in Phase 1.

Did the mitigation project adequately compensate for the impacts?

The following table provides an overview of the results from the function assessment evaluations. The potential of the site to perform functions was based on the scores from the function assessment model for depressional outflow wetlands (with a control structure). The pre-potential of the site to perform functions was based on the physical description of the characteristics and structure of the wetland prior to enhancement activities and relied on expert knowledge to determine the level of functioning. This was done using the approach for decision-making (see footnote 2 p. 5).

FUNCTION	Pre-P.	Poten.	Oppor.	Contri.	Comments
Sediments	L	M	M	MOD	
Nutrients	ML	M	*H	MOD	*Ag land, High phosphorous in groundwater
Metals/toxic organics	ML	MH	H	HI	
Peak flows	ML	M	H	MOD	
Downstream erosion	ML	M	H	MOD	
General habitat	L	ML	L	*MIN	*This reflects the contribution for the other species specific habitat contributions.
Invertebrates	NA	ML	-	MOD	
Amphibians	NA	ML	-	MOD	
Anadromous fish	NA	L	L	NAA	
Resident fish	NA	L	-	MIN	
Wetland assoc. birds	L	ML	-	MIN	
Wetland assoc. mammals	L	ML	-	MIN	
Native plant richness	L	ML	-	MIN	
Primary prod/export	M	MH	-	MIN	

*Pre-P. = pre-potential of the site to perform a function; Poten. = current potential of the site to perform a function; Oppor. = opportunity of the site to perform function; Contri. = contribution of mitigation activities to the performance of a function.

*NA = Not Applicable; L = Low; ML = Moderately low; M = Moderate; MH = Moderately high; H = High.

*NAA = Not at all contributing; MIN = Minimal contribution; MOD = Moderate contribution; HI = High contribution.

Summary of Functions

- *Water quality* – Moderate potential, Moderate contribution
- *Water quantity* – Moderate potential, Moderate contribution
- *General habitat* – Moderately low potential, Minimal contribution

Overall Rationale

This project resulted in impacts to 1.99 acres of EM wetlands. The mitigation activities resulted in 5.85 of enhanced wetland, of which 1.70 acres of SS vegetation (converted from EM) was established. The enhancement activities compensated for functions associated with the original 1.99 acre wetland fill, but functions of the mitigation area are being degraded because of the development's impacts to the remaining wetland. Though the site has a moderate potential to perform water quality functions and the enhancement actions provided a moderate contribution to these functions, the addition of stormwater from the development is canceling these benefits. In addition, the mitigation site's minimal contribution to wildlife habitat was not provided over a sufficient enough area to adequately compensate for the impacts. **It was determined that this mitigation project DID NOT adequately compensate for the impacts.**

Overall Success and Possible Factors Correlated with Success

This enhancement project was considered **MINIMALLY SUCCESSFUL** (the project achieved the ecologically relevant measures and did not adequately compensate for the impacts). The main factors that could have determined the outcome of this project are listed below.

Contributed to success

- Adequate hydrology (was wetland before, but added water control structure);
- Monitoring of site; and
- Good follow-up.

Did not contribute to success

- Poor site selection (minimal buffers); and
- Stormwater inputs.

Was the mitigation site the same HGM and Cowardin class(es) as the impacts?

The mitigation area was the same HGM subclass as the lost wetlands. However, the mitigation area has water levels that are controlled by a weir making it an atypical HGM subclass. The mitigation area is SS (1.70 acres) and EM (4.15 acre EM) whereas the impacts were to EM (1.99 acres) wetlands. The mitigation activities resulted in a conversion of EM to SS. The mitigation area is therefore somewhat the same Cowardin classification as the lost wetlands.

Ecological Condition

Hydroperiods

This site had areas with seasonal inundation (> 1 month), occasional inundation (< 1 month) and saturation (seldom inundated).

Dominance by Non-Native Plant Species

At the time of the site visit, non-native species dominated 25-49% of the cover within the wetland.

Plant Species Diversity

The SAT identified 40 native species and 18 non-native species on this site.

Buffers

At the time of the site visit, this site had a moderate quality buffer (100m of forest, scrub, relatively undisturbed grassland or open water around at least 25% of the wetland).

Corridors and Connectivity

At the time of the site visit, this site had minimal connectivity to another habitat area (the site is connected to a relatively undisturbed area by a vegetated corridor 5-50m wide).

Land Uses

Within 1 km of the wetland mitigation area the land uses were as follows: 75% developed (51% high density residential, 11% low density residential, and 13% urban/commercial), 14% undeveloped (3% undeveloped forests and 11% other undeveloped areas), and 11% agriculture.

Impact Information

This project, implemented by a public entity, is located in Snohomish County. It entailed the filling of 0.06 acres of wetlands under a Corps Nationwide 14 (road crossings) permit. The wetlands lost were depressional outflow/riverine impounding, FO (0.03 acres) and SS (0.03 acres) wetlands with an EM understory. The development activities also disturbed the buffer. The wetlands were rated as Category 2 (City Sensitive Area Ordinance), based on the wetlands size and presence of three wetland communities.

Dominant vegetation and water sources

Dominant canopy cover species were POTRI and ALRU. The SS layer was usually sparse and consisted of COSE and *Salix* spp. The herb layer was also sparse and consisted of PHAR and *Tolmiea* spp. Where the FO cover was sparse the SS layer became much denser. The site was roughly an equal mix of PFO and PSS communities in a mosaic-like distribution. The wetland received water from precipitation, overland flow from overbanking of the river, and runoff from adjacent roadways.

Functions provided

According to the delineation report for this project, the primary functions provided included wildlife habitat and shoreline protection/floodplain protection during flood events. Water quality improvement, groundwater discharge and recharge, and flood storage were limited due to the disturbed nature of the site topography and hydrologic regime.

Wetland Mitigation Required/Implemented

This project required the restoration of 0.28 acres of wetlands on-site and contiguous with the adjacent existing wetland as well as buffer restoration and enhancement. The *goals* of the mitigation plan were:

- To compensate for the filling of 0.06 acres of SS wetland by creating 0.28 acres of wetland. The created wetland was to provide functional values equal to or greater than those lost from filling and construction (i.e. create a greater diversity of wetland types);
- To compensate for the loss of 58, 500 feet of wetland buffer as a result of development by:
 - Retaining an additional 31,875 square feet of wetland buffer on site;
 - Restoring 5,950 square feet of wetland buffer and wetland along the abandoned roadbed in the northeast vicinity of the site to discourage easy intrusion into the wetland and buffer;
 - Enhancing 12,500 square feet of wetland buffer along the north edge of the new parking lot by creating a dense barrier planting where the buffer has been significantly reduced in size; and
 - Enhancing the edge of the wetland buffer immediately adjacent to the mowed lawn area by developing a dense informal hedge to provide protection and additional wildlife habitat; and
- To create large contiguous areas of wetland and buffer by siting restoration, enhancement, and mitigation areas adjacent to the existing wetland system on site.

Major mitigation actions included:

1. Excavation;
2. Removal of fill to native wetland soils; and
3. Planting.

As discovered in Phase 1, excavation was only partially completed (2/3rds) due to the discovery of creosote, and the site was not planted. All native vegetation present at the site has naturally colonized. The water regime was to be supported by precipitation and high groundwater, as well as subsurface runoff from adjacent land and overflow from the river. The applicant requested to leave the wetland as is, due to it being a “high-functioning wetland with natural plant regeneration.” The applicant was encouraged to work with the City and Ecology on a Voluntary Cleanup Plan for the creosote.

Site Assessment Information

This site was approximately 3(+) years old at the time of the site visit. The SAT identified approximately 0.23 acres of restored wetlands on-site. This is not within the 10% margin of error for acreage establishment. The site was a depressional outflow/riverine impounding EM (0.19 acres) and OW (0.04 acres) wetland.

This project was described in the permit to be a combination of creation and enhancement. Information from the consultant and the mitigation plan indicated that fill was removed from a historic wetland area. We therefore classified the project as restoration.

Vegetation was dominated by ALPL-AQ, *Sparganium* spp., PHAR, and *Agrostis* spp. in some areas. Some *Salix* spp. saplings were also moving into the site. Bull frogs were prevalent in the ponded area of the site.

Other wildlife observations included: American robin, Swainson’s thrush, song sparrow, yellow warbler, tree frogs, and a garter snake.

The site was considered to be a Category 3 (10 points) wetland according to the WA State Wetland Rating System for Western Washington (see footnote 1 p. 3).

Note: Though establishment of wetland buffer areas was required, we did not determine the acreage of buffer created or enhanced and did not assess buffers during the Phase 2 site visit. The establishment of the required buffers was not included in our overall evaluation of the project.

Site Evaluation Results

Did the mitigation project achieve the ecologically relevant measures?

1. The mitigation project did not establish the acreage (within 10%) for the required mitigation activity (0.23 acres established / required). **NO**
2. This project had four performance standards (P.S.):
 - Two of the P.S. were assessed during Phase 2;
 - All of the assessed P.S. were attained (100%); but
 - None of the P.S. were considered to be significant.

Therefore, an evaluation of the significant P.S. was not applicable (NA) for this site. **NA**

3. This project somewhat fulfilled the goals and objectives. The mitigation activities resulted in replacement of the area (not the required acreage), but did not result in replacement of functions at an equal or greater level (see table of functions on next page). **SOMEWHAT**

Based on the site evaluation results, **the mitigation was determined to be SOMEWHAT achieving the ecologically relevant measures.**

Phase 1 comparison – This mitigation project was determined to be built to plan in Phase 1. A status report outlined the current conditions, which was that the mitigation was on hold due to the presence of creosote and this satisfied the Corps requirements for as-built submittal. In Phase 1, of the four P.S., two out of two (100%) of the P.S. were assessed and met. In Phase 2, the same P.S. were not considered to be significant. This project was determined to be in compliance in Phase 1.

Did the mitigation project adequately compensate for the impacts?

The following table provides an overview of the results from the function assessment evaluations. The potential of the site to perform functions was based on the scores from the function assessment model for depressional outflow and riverine impounding wetlands.

FUNCTION	Pre-P.	Poten.	Oppor.	Contri.	Comments
Sediments	NA	M	M	HI	
Nutrients	NA	ML	M	MOD	
Metals/toxic organics	NA	M	*H	HI	*Toxic organics exposed
Peak flows	NA	M	L	MOD	
Downstream erosion	NA	M	*L	MOD	*Position in landscape
General habitat	NA	ML	M	MOD	
Invertebrates	NA	ML	-	*MIN	*Toxic organics exposed, bull frogs
Amphibians	NA	ML	-	*MIN	*Toxic organics exposed, bull frogs
Anadromous fish	NA	MH	H	HI	
Resident fish	NA	*ML	-	MOD	*Bull frogs
Wetland assoc. birds	NA	ML	-	MOD	
Wetland assoc. mammals	NA	ML	-	MOD	
Native plant richness	NA	ML	-	MOD	
Primary prod/export	NA	M	-	HI	

*Pre-P. = pre-potential of the site to perform a function; Poten. = current potential of the site to perform a function; Oppor. = opportunity of the site to perform function; Contri. = contribution of mitigation activities to the performance of a function.
 *NA = Not Applicable; L = Low; ML = Moderately low; M = Moderate; MH = Moderately high; H = High.
 *NAA = Not at all contributing; MIN = Minimal contribution; MOD = Moderate contribution; HI = High contribution.

Summary of Functions

- *Water quality* – Moderate potential, High contribution
- *Water quantity* – Moderate potential, Moderate contribution
- *General habitat* – Moderately low potential, Moderate contribution

The presence of creosote limited the sites potential to perform general habitat functions. The occurrence of bull frogs, which is not a noted characteristic in the function assessment methods, also limited the site’s potential to perform some of the habitat functions, particularly for resident fish.

Overall Rationale

This project resulted in the loss of 0.06 acres of PSS/PFO wetlands. The mitigation activities resulted in the restoration of 0.23 acres (0.19 acres of PEM and 0.04 acres of POW) of wetlands. One of the primary functions of the lost wetlands was wildlife habitat. The mitigation area had a moderate contribution to wildlife habitat and water quantity, and a high contribution to water quality. The mitigation area did not replace the functions associated with SS and FO wetlands,

but it provided EM and OW wetlands as an exchange. Some shrub saplings are becoming established by natural recruitment. Though the mitigation site replaced the filled wetlands in area, the mitigation activities resulted in the mobilization of creosote, a toxic organic substance, thereby producing further impacts and degrading water quality and wildlife habitat.

It was determined that the mitigation project DID NOT adequately compensate for impacts.

Overall Success and Possible Factors Correlated with Success

This restoration project was considered **MINIMALLY SUCCESSFUL** (the project somewhat achieved the ecologically relevant measures and did not adequately compensate for the impacts). The main factors that could have determined the outcome of this project are listed below.

Contributed to success

- Adequate water; and
- Natural recruitment of vegetation (nature is incredibly resilient).

Did not contribute to success

- Poor planning and site selection (should have thought to test the ground considering that the area has a history of industrial land use and contamination);
- Lack of background information; and
- Lack of follow-up by agencies.

Was the mitigation site the same HGM and Cowardin class(es) as the impacts?

The mitigation project was the same HGM subclass (depressional outflow/riverine impounding) as the lost wetlands. At this point the mitigation area is not the same Cowardin class as the lost wetlands. The mitigation area is EM and OW, whereas the lost wetlands were FO and SS.

Ecological Condition

Hydroperiods

This site had areas with permanent flooding or inundation, seasonal flooding or inundation (> 1 month) and saturation (seldom inundated).

Dominance by Non-Native Plant Species

At the time of the site visit, non-native species dominated 1-24% of the cover within the wetland.

Plant Species Diversity

The SAT identified 20 native species and 5 non-native species on this site.

Buffers

At the time of the site visit, this site had a low quality buffer (have paved roads within 25m around at least 5% of the wetland).

Corridors and Connectivity

At the time of the site visit, this site had high connectivity and corridors to other habitat areas (the site is part of a riparian corridor greater than 50m wide connecting 2 or more wetlands within 1km with at least 30% shrub or forest cover in the corridor).

Land Uses

Within 1 km of the wetland mitigation area the land uses were as follows: 28% developed (17% high density residential, 3% low density residential, and 8% urban/commercial), 41% undeveloped (23% undeveloped forests and 18% other undeveloped areas), and 31% agriculture.

Impact Information

This project, implemented by a public entity, is located in King County. It entailed the filling of 0.22 acres of wetlands under a Corps Individual After-The-Fact Permit (the wetland was mechanically land cleared prior to permit approval). The impacts were to PEM, depressional outflow wetlands. There was no wetland rating available for the filled wetland.

Dominant vegetation and water sources

According to the mitigation plan for this project, vegetation in this shallow marsh wetland was dominated by TYLA, LYAM, *Carex* spp. and *Juncus* spp. in the northwestern portion of the property. An expanse of ponded water supported aquatic vegetation such as *Lemna* spp. The site appeared to have been cleared in the past as there were no overstory trees. Several large cottonwood and spruce stumps remained in the wetland. Shrubs were beginning to grow within and around the wetland including RUSP, SPDO, COSE, and POTRI saplings. A small drainage ditch was located along the northern property line and fed into a creek.

Functions provided

According to the mitigation plan for this project, the filled wetland served as an area for flood mitigation and aquifer recharge as well as contributed to water quality through cleansing abilities. A variety of songbirds were observed on and adjacent to the property including song sparrows, bushtits, chickadees and kinglets. Six mallards were seen feeding in the wetland during one of the consultant's site visits. Amphibians, reptiles, and mammals could have been expected to visit the wetland as well, though its usefulness was limited by lack of cover and proximity to high traffic volumes.

Wetland Mitigation Required/Implemented

This project required the creation of 0.21 acres of wetlands on-site and preservation of 2.5 acres of existing wetlands off-site. The *goal* of this mitigation plan was:

- To create a wetland, similar to the wetland to be filled, in the northeastern portion of the property by removing fill and excavating to access groundwater. It was designed to offer enhanced functions and values over the filled wetland.

Specific *objectives* included:

- PEM wetland would be created with a dense border of shrubs and trees to protect and screen the wetland;
- The created wetland would serve as an area for flood mitigation and aquifer recharge, and contribute to water quality by filtering out pollutants; and
- Wildlife habitat would be provided by a diverse mix of plant species with high value for food and cover, and new habitat structures which will attract a greater diversity of animals than used the existing wetland.

Small mammals, furbearers, songbirds, waterfowl, amphibians and reptiles were expected to live in and regularly visit the completed wetland. In addition, deer and predatory birds such as owls and hawks also may use the site on occasion. Enhanced wildlife habitat would be an immediate result of the proposed project, and would continue to improve over time as plants mature to create additional age and structural diversity.

Major mitigation actions included:

1. Removal of fill;
2. Excavation to access groundwater;
3. Planting; and
4. Placement of habitat features (fallen tree, root wads, snag, and bird boxes).

Stockpiled soils from the existing wetland were placed in the created wetland to ensure appropriate soils and a seed bank. The water regime was to be supported by groundwater and surface runoff from a spring-fed drainage ditch. Trees and shrubs were planted in the fall and emergents in the spring. There has been active maintenance of non-native and invasive weeds, including SODU, RUDI, CYSC, LYSA, and *Convolvulus* spp. by hand pulling and cutting. Also, dead plants were replaced. Monitoring occurred annually in September for five years and included photographic documentation, counts of healthy plants, general plant cover estimates and observations of plant health and wildlife use.

According to the files, the Corps closed the file for this project, stating that the mitigation was successfully completed in compliance with all of the conditions of the permit. No further monitoring would be required.

Copies of the restrictive covenant on the deed for the property for both the on-site creation area and the off-site preservation area were also found in the files.

Site Assessment Information

This site was approximately 5 years old at the time of the site visit. The SAT identified approximately 0.16 acres of created wetland. Though this project was not within the 10% margin of error we gave the project the benefit of the doubt due to the fact that there was a thick canopy which did not allow for the collection of very many GPS points. Based on the SAT knowledge of the site it was determined that the GPS positions did not adequately represent the size of the site. The site was a depressional closed FO / SS (0.11 acres), and EM (0.05 acres) wetland. The FO area was dominated by ALRU. The SS area was dominated by *Salix* spp. The EM area was dominated by TYLA and *Lemna* spp. Both installed and volunteer vegetation was thriving. Estimated vegetative cover was 100% with very dense volunteer ALRU around the edges and TYLA, *Juncus* spp., and *Carex* spp., in the interior, wetter areas. The mitigation site is enclosed within a chain link fence with very little area surrounding it in the way of vegetated buffers.

Wildlife observations included: song sparrows.

The site was considered a Category 3 (5 points) wetland according to the WA State Wetland Rating System for Western Washington (see footnote 1 p. 3). This was mainly due to its small size and lack of buffers and connectivity.

Site Evaluation Results

Did the mitigation project achieve the ecologically relevant measures?

1. The mitigation project established the acreage (within 10%) for the required mitigation activity (*0.16 acres established / 0.21 acres required). **YES**

*Though this project was not within the 10% margin of error we gave the project the benefit of the doubt due to the fact that there was a thick canopy which did not allow for the collection of very many GPS points. Based on the SAT's knowledge of this site it was determined that the GPS positions did not adequately represent the size of the site.

2. This project had three performance standards (P.S.):
- Two of the P.S. were assessed during Phase 2;
 - All of the assessed P.S. were attained (100%); but
 - None of the P.S. were considered to be significant.

Therefore, an evaluation of the significant P.S. was not applicable (NA) for this site. **NA**

3. This project somewhat fulfilled the appropriate goals and objectives. The mitigation project provided similar functions to what was lost. One of the objectives was to create an EM wetland with a dense border of shrubs and trees. However, the site is mostly FO / SS with a pocket of EM. Another objective was to attract a greater diversity of wildlife. The presence of a chain link fence and the extremely dense trees and shrubs restricts wildlife movement and use, particularly for waterfowl and deer. Another objective was for the created wetland to contribute to water quality and quantity. The project did result in a high contribution to water quality and quantity on this site. Therefore, this project somewhat fulfilled the appropriate goals and objectives. **SOMEWHAT**

Based on the above, **the mitigation was determined to be SOMEWHAT achieving the ecologically relevant measures.**

Phase 1 comparison – The mitigation project was determined to be built to plan in Phase 1. Of the three P.S., one out of one (100%) of the P.S. was assessed and met. The same P.S. was not considered significant in Phase 2. This project was determined to be in compliance in Phase 1.

Did the mitigation project adequately compensate for the impacts?

The scores from the function assessment models for depression closed wetlands could not be used due to the small size (< 0.25 acres) of the mitigation area. Therefore, the potentials were determined based on the data/characteristics collected on the function assessment forms rather than the calculated scores.

FUNCTION	Pre-P.	Poten.	Oppor.	Contri.	Comments
Sediments	NA	H	H	HI	
Nutrients	NA	M	H	HI	
Metals/toxic organics	NA	M	H	HI	
Peak flows	NA	H	L	HI	Located in lower portion of the watershed
Downstream erosion	NA	H	L	HI	
General habitat	NA	M	L	MOD	
Invertebrates	NA	M	-	HI	
Amphibians	NA	L	-	MIN	
Anadromous fish	NA	NA	NA	NA	Closed system-not applicable
Resident fish	NA	NA	NA	NA	Closed system-not applicable
Wetland assoc. birds	NA	L	-	MIN	Closed canopy
Wetland assoc. mammals	NA	L	-	NAA	Fence around the site
Native plant richness	NA	ML	-	MOD	
Primary prod/export	NA	NA	NA	NA	Closed system-not applicable

*Pre-P. = pre-potential of the site to perform a function; Poten. = current potential of the site to perform a function; Oppor. = opportunity of the site to perform function; Contri. = contribution of mitigation activities to the performance of a function.

*NA = Not Applicable; L = Low; ML = Moderately low; M = Moderate; MH = Moderately high; H = High.

*NAA = Not at all contributing; MIN = Minimal contribution; MOD = Moderate contribution; HI = High contribution.

Summary of Functions

- *Water quality* – Moderately high potential, High contribution
- *Water quantity* – High potential, High contribution
- *General habitat* – Moderate potential, Moderate contribution

Overall Rationale

This project resulted in impacts to 0.22 acres of EM wetlands. The mitigation activities resulted in the creation of 0.16 acres of FO / SS and EM wetlands on-site. The mitigation site has exchanged the wildlife functions associated with EM wetlands for the wildlife functions associated with a more FO / SS wetland, however the creation of this depressional closed wetland resulted in a high contribution to the water quality and water quantity functions on-site. In addition 2.5 acres of wetlands were preserved off-site. **It was determined that the mitigation project adequately COMPENSATED for the impacts.**

Overall Success and Possible Factors Correlated with Success

This creation project was considered **MODERATELY SUCCESSFUL** (the project somewhat achieved the ecologically relevant measures and adequately compensated for the impacts). The main factors that could have determined the outcome of this project are listed below.

Contributed to success

- Prompt and thorough maintenance and implementation of contingency measures;
- Close work and communication during construction and monitoring (someone on-site to oversee project implementation);
- Reasonable design given the site's constraints; and
- Adequate hydrology.

Did not contribute to success

- Constraints of the site location.

Was the mitigation site the same HGM and Cowardin class(es) as the impacts?

The mitigation wetland did not provide in-kind replacement of Cowardin class and HGM type. The trade-off was depressional outflow for depressional closed and EM for FO / SS with a pocket of EM. The mitigation site is a typical wetland subclass, however historically wetlands in this area most likely drained to the lake.

Ecological Condition

Hydroperiods

This site had areas with seasonal inundation (> 1 month), occasional inundation (< 1 month) and saturation (seldom inundated).

Dominance by Non-Native Plant Species

At the time of the site visit, non-native species dominated 25-49% of the cover within the wetland.

Plant Species Diversity

The SAT identified 35 native species and 6 non-native species on the site.

Buffers

At the time of the site visit, this site had a low quality buffer (have paved roads within 25m around at least 5% of the wetland) There is a chain link fence surrounding the wetland. Buffers inside the fence are 2-5m.

Corridors and Connectivity

At the time of the site visit, this site did not have any corridors or connections to other habitat areas.

Land Uses

Within 1 km of the wetland mitigation area the land uses were as follows: 62% developed (52% high density residential and 10% urban/commercial) and 38% undeveloped (8% undeveloped forests and 30% other undeveloped areas).

Impact Information

This project, implemented by a public entity, is located in Clark County. It entailed the filling of 1.31 acres of wetlands under a Corps NWP 26. The impact was to a PEM, temporarily flooded slope wetland. The wetlands were rated as Category 4 according to the County Wetlands Protection Ordinance.

Dominant vegetation and water source

According to the enhancement plan for this project, vegetation consisted of HOLA, *Agrostis* spp., LOCO, RARE, CAO, JUEF, and PHAR. It was mainly an open grassy area that had been used primarily for agricultural purposes since the early 1900's, most recently as a hay field in 1990. There was also a shrub row along the western property boundary, which consisted of *Salix* spp., SPDO, and COSE. The major hydrologic feature was a small drainage ditch that extended across the width of the property on the northern half of the site.

Functions provided

The WET analysis was not conducted for the wetlands on the site. However, the major processes used by WET to evaluate wetland functions and values, were compared with the characteristics of the wetlands on the site. The results indicated that the wetlands possessed few of those processes. According to the enhancement plan, this was due to the type of wetlands (primarily saturated soils) and long-term impacts and alterations on the site for agricultural purposes.

Wetland Mitigation Required/Implemented

This project required the enhancement of the remaining 3.49 acres of wetlands on-site and 0.05 acres of upland. The *goal* of the enhancement plan was:

- To provide increased wildlife habitat on the site by planting trees and shrubs to supplement the existing ground cover and increase the water quality through biofiltration of surface water entering the wetland.

Specific *objectives* of the enhancement plan were to provide the following wetland functions and values (based on WET):

- Wildlife diversity/abundance;
- Aquatic diversity/abundance; and
- Sediment/toxicant retention.

Major mitigation actions included:

1. Supplementing the existing vegetation with native tree and shrub plantings on 2.58 acres to provide the opportunity for increased wildlife use;
2. Planting trees and shrubs along the property lines and the building site to shield a major portion of the wetland from adjacent activities;
3. Leaving 0.96 acres of existing vegetation to provide edge habitat for wildlife use; and
4. Constructing biofiltration swales along the sides of the building site to provide filtration of surface water entering the wetland from the area.

Bare root plants were planted in the winter in a clumped pattern in the hope that within a few years that the area would be covered with a mosaic of herbaceous cover, shrubs and trees from deliberate plantings and natural colonization from adjacent areas. Some of the first year plantings were installed by kids from a neighboring school.

Problems included low survival of woody plant species and the spread of PHAR. Plant substitutions, replanting, irrigation, and other maintenance practices were implemented to reduce woody plant mortality. For example, black mesh was placed around the base of each plant and a one-foot diameter herbaceous free zone was established around the base of each tree and shrub to control PHAR. Rodeo was also applied twice by the wicking method in an attempt to control PHAR.

There were no planned changes to hydrology, which was primarily groundwater and, thus, irrigation was required. However, during the construction activities drain tiles were broken accidentally. This stopped the groundwater from flowing directly in to the adjacent ditch. This changed the anticipated water regime, making the site wetter. The planting plan had to be adjusted accordingly. ALRU and AMAL had a high mortality rate, probably due to the unanticipated hydrologic regime and were substituted with CRDO and POTRI.

Monitoring was required during the first growing season following the initial planting and once a year during five successive growing seasons to determine vegetation plant mortality.

There was a lot of follow-up on monitoring and contingency for this site. The Corps closed the file for this project in June of 2000. According to a Corps letter to the applicant, all contingency plans to bring the site into compliance were accomplished. The results of those actions were considered marginally successful, and while the Corps was not totally satisfied with the results, no further contingencies were required.

Site Assessment Information

This site was approximately 6 years old at the time of the site visit. The SAT identified approximately 3.34 acres of enhanced wetland. This is within the 10% margin of error for acreage establishment. The site was a slope (water from the site moves from the topographically higher east side to the topographically lower west side to a ditch that runs along the western border and eventually connects with a larger wetland complex), SS (0.43 acres converted from EM) and EM (2.91 acres) wetland. The water regime consisted mostly of seasonal inundation.

Vegetation was dominated by LOCO, JUEF, CASC, PHAR, and other non-native grasses. *Salix* spp., *Rosa* spp., FRLA, and COSE dominated the shrub areas.

Wildlife observations included: garter snake, black-capped chickadee, common yellow-throat, and a song sparrow.

This site was considered to be a Category 2 (23 points) wetland according to the WA State Wetland Rating System for Western Washington (see footnote 1 p. 3).

Site Evaluation Results

Did the mitigation project achieve the ecologically relevant measures?

1. The mitigation project established the acreage (within 10%) for the required mitigation activity (3.34 acres established / 3.49 acres required). **YES**
2. This project did not have any specific performance standards (P.S.) in the mitigation plan, however as part of the WQC, the mitigation was required to attain two P.S.:
 - One of the P.S. was assessed during Phase 2;
 - The one assessed P.S. was not attained (0%);
 - The one assessed P.S. was considered to be significant; and
 - The significant P.S. was not attained (0%).

Therefore, this project did not attain the significant P.S. **NO**

3. This project fulfilled the appropriate goals and objectives. They provided an increase (minimal) to wildlife habitat and water quality. They did not increase the aquatic habitat diversity (this was an inappropriate objective since the plan did not include aquatics). **YES**
Based on the above, **the mitigation was determined to be SOMEWHAT achieving the ecologically relevant measures.**

Phase 1 comparison- This mitigation project was determined to be built to plan (planting and biofiltration swales) in Phase 1. No as-built was required and contingency required additional plantings and plant substitutions. Of the two P.S., one out of two (50%) of the P.S. assessed using the Phase 1 methods was met. This same standard was not attained in Phase 2. This project was determined to be somewhat in compliance in Phase 1.

Did the mitigation project adequately compensate for the impacts?

The following table provides an overview of the results from the function assessment evaluations. The mitigation area is a slope wetland with some small microdepressions. There are currently no function assessment models for slope wetlands. Therefore, the potentials were determined based on the data/characteristics collected on the function assessment forms rather than the calculated scores. Ratings were made based on a comparison to other slope wetlands using the approach for decision-making (see footnote 2 p. 5).

FUNCTION	Pre-P.	Poten.	Oppor.	Contri.	Comments
Sediments	H	H	M	NAA	
Nutrients	ML	M	H	MOD	Site wetter / broken drain tiles, slowed down water
Metals/toxic organics	M	M	H	NAA	
Peak flows	NA	NA	NA	NA	We do not know much about how slope wetlands perform water quantity functions.
Downstream erosion	NA	NA	NA	NA	“
General habitat	L	ML	M	MIN	Added structural diversity, removed grazing
Invertebrates	L	M	-	MOD	Added structural diversity, removed grazing
Amphibians	NA	L	-	MIN	Lack of H2O depth, made wetter and added structure
Anadromous fish	NA	NA	NA	NA	Slope wetland, no fish habitat
Resident fish	NA	NA	NA	NA	Slope wetland, no fish habitat
Wetland assoc. birds	NA	L	-	MIN	Not habitat for aquatic birds
Wetland assoc. mammals	L	L	-	NAA	
Native plant richness	NA	L	-	MIN	Very high non-native dominance (LOCO, PHAR)
Primary production/export	M	M	-	NAA	Stopped haying, broke drain tiles and planted deciduous shrubs.

*Pre-P. = pre-potential of the site to perform a function; Poten. = current potential of the site to perform a function; Oppor. = opportunity of the site to perform function; Contri. = contribution of mitigation activities to the performance of a function.

*NA = Not Applicable; L = Low; ML = Moderately low; M = Moderate; MH = Moderately high; H = High.

*NAA = Not at all contributing; MIN = Minimal contribution; MOD = Moderate contribution; HI = High contribution.

Summary of Functions

- *Water quality* – Moderately high potential, Minimal contribution
- *Water quantity* – No evaluation (NA)
We do not know enough about how water quantity functions are performed for slopes.
- *General habitat* – Moderately low potential, Minimal contribution

Overall Rationale

This project resulted in impacts to 1.31 acres of wetland. The SAT identified 3.34 acres of wetlands on-site, of which 0.43 acres of SS vegetation (converted from EM) was established. The mitigation activities did not provide the same functions (water quality and some wet meadow habitat) that were lost. There was an exchange in functions associated with a somewhat drier EM meadow wetland for a wetter shrubbier wetland. Though the site met the required mitigation acreage, enhancement provided only a minimal contribution to the potential of the site to perform water quality and general habitat functions. Based on the above, it was concluded that the minimal contribution to functions was not provided over a sufficient enough area to compensate for the lost wetlands (2.5:1 ratio). **It was determined that this mitigation project DID NOT adequately compensate for the impacts.**

Overall Success and Possible Factors Correlated with Success

This enhancement project was considered **MINIMALLY SUCCESSFUL** (the project somewhat achieved the ecologically relevant measures and did not adequately compensate for the impacts). The main factors that could have determined the outcome of this project are listed below.

Contributed to success

- Corps follow-up; and
- Same consultant involved throughout the whole project.

Did not contribute to success

- High plant mortality due to unplanned change in hydrology (breaking of drain tiles = lack of baseline hydrologic studies); and
- Invasive and non-native species.

Was the mitigation site the same HGM and Cowardin class(es) as the impacts?

The mitigation was on-site and of the same HGM class (slope) as the adjacent impact area. The impact site and pre-enhancement site were both EM. The mitigation activities resulted in an exchange of EM for SS wetlands.

Ecological Condition

Hydroperiods

This site had areas with seasonal inundation (> 1 month) and saturation (seldom inundated).

Dominance by Non-Native Plant Species

At the time of the site visit, non-native species dominated > 75% of the cover within the wetland.

Plant Species Diversity

The SAT identified 39 native species and 9 non-native species on this site.

Buffers

At the time of the site visit, this site had a moderate quality buffer (100m of forest, scrub, relatively undisturbed grassland or open water around at least 25% of the wetland).

Corridors and Connectivity

At the time of the site visit, this site had minimal connectivity and corridors to other habitat areas (the site is connected to relatively undisturbed areas with a vegetated corridor 5-50m wide).

Land Uses

Within 1 km of the wetland mitigation area the land uses were as follows: 42% developed (low density residential), 10% undeveloped (8% undeveloped forests, 2% other undeveloped areas), and 48% agriculture.

Impact information

This project, implemented by a public entity, is located in Kitsap County. It entailed the filling of 0.67 acres of wetlands under a Corps NWP 26. The impacts were to the PSS (0.33 acres) and PEM (0.34 acres) portions of a FO wetland associated with a creek. Overall, the lost wetlands were rated as Category 2 FO / SS wetlands according to the WA State Wetland Rating System for Western Washington (see footnote 1 p. 3). According to the Corps, the specific area that was impacted contained portions of a grazed pasture and was not the nicest portion of the wetland and was separated from the main body of the wetland by construction activities. The wetlands were also not considered unique for the area.

Dominant vegetation

Vegetation was dominated by ALRU, SPDO, RHPU, RARE, RUUR, grasses in the SS portions and JUEF, RARE, LOCO, ATFI, RULA, RONU, RUSP in the EM portions.

Functions provided

According to a Corps MFR, the wetland was described as being low to moderate-high for all values and functions.

Wetland Mitigation Required/Implemented

This project required the on-site enhancement of 0.9 acres of wetlands and 1.96 acres of buffer by returning it to former forested conditions by planting conifer and deciduous trees and shrubs. Prior to enhancement, Wetland B (Category 3), was a degraded soft rush pasture, which appeared to have been partially created by past grading and filling activities for placement of a pipeline. The wetland drains to a ditch on the south end of the property. Wetland C (Category 2) was a degraded forested wetland that lacked a shrub layer. Wetland C had a heavily grazed understory and a vegetated pond at the north end. Both areas were described to have a seasonally flooded water regime. There were no specific goals and objectives detailed in the mitigation plan for this project.

Major mitigation actions included:

1. Planting deciduous species in clumps throughout the most degraded portions of the wetland and buffer; and
2. Planting coniferous species individually mostly along the outer portion of the buffer.

Planting occurred in the winter and consisted of cuttings, bare-root stock and one gallon potted plants. Plantings generally followed the site plan, except where hydrologic conditions necessitated moving the clumps to a more appropriate location (at most 10 feet in some cases). A prison work crew installed the plants and the consultant indicated that heavily compacted soils were a problem during mitigation construction. The consultant indicated that, due to a lack of survival of the original plantings, replanting was done in year two and did not work. Monitoring was required for three years to assess plant survival and cover. According to the consultant, further maintenance and contingency measures were not implemented due to inadequate funding.

The water regime was supported by direct rainfall and a perched water table in the lower areas of Wetland B and surface water from upslope areas with some additional inputs from seepage and direct rainfall in Wetland C. Both wetlands drain to a ditch, which eventually flow into the creek.

Site Assessment Information

This site was approximately 3(+) years old at the time of the site visit. The SAT identified 0.582 acres of existing wetland, which was to be enhanced by planting trees and shrubs. Almost all of the plantings died. Therefore, it was concluded that the condition of this site was not different from conditions prior to the enhancement activities. As a result, 0 acres of wetland enhancement acreage was established. This was not within the 10% margin of error for acreage establishment. There were two existing wetlands on-site, one of which was considered depressional outflow and one of which was considered depressional closed. A total of 0.10 acres of pre-existing SS and 0.48 acres of pre-existing EM were identified on-site.

Vegetation was dominated by JUEF, RARE, and grass spp. ALGE dominated the seasonally inundated areas. ALRU, *Salix* spp., and *Rosa* spp. dominated the existing shrub areas.

Wildlife observations included: garter snakes, willow flycatcher, evidence of beaver use in an adjacent ditch, and evidence of deer browsing.

This site was considered to be a Category 3 (15 points) wetland according to the WA State Wetland Rating System for Western Washington (see footnote 1 p. 3).

Note: Plant survival was minimal to not at all in the upland buffer area that was to be enhanced.

Site Evaluation Results

Did the mitigation project achieve the ecologically relevant measures?

1. The mitigation project did not establish the acreage (within 10%) for the required mitigation activity (0 acres established / 0.9 acres required). This project was an enhancement project. None of the wetland enhancement plantings survived, therefore, the mitigation activities resulted in the establishment of 0 acres of enhancement. **NO**
2. This project had two performance standards (P.S.):
 - Both of the P.S. were assessed during Phase 2;
 - None of the assessed P.S. were attained (0%); and
 - None of the P.S. were considered to be significant (NA).

Therefore, an evaluation of the significant P.S. was not applicable (NA) for this site. **NA**

3. This project did not have any goals or objectives outlined in the mitigation plan. **NA**

Based on the above, **the mitigation was determined to be NOT achieving the ecologically relevant measures.**

Phase 1 comparison- This mitigation project was determined to be not built to plan (planting). We were unable to determine if an as-built was required. In Phase 1 and 2 the two P.S. were assessed and not met (0%). In Phase 2 the P.S. were not considered to be significant. This project was determined to be not in compliance in Phase 1.

Did the mitigation project adequately compensate for the impacts?

Overall Rationale

This project resulted in impacts to 0.67 acres of the SS and EM portions of a forested wetland. The mitigation activities (enhancement plantings) were not successful. This project proposed to enhance a degraded pasture by adding vegetative structure and diversity. Numerous trees and shrubs in a variety of species were planted, but after 3 years (at the time of the site visit), virtually none of these plants had survived and no natural colonization was observed. The enhancement project did not achieve the proposed vegetative structure and/or diversity. The site was

essentially the same as it was prior to enhancement. The mitigation activity did not contribute to the potential for wetland functions to be performed on the site. **It was determined that this mitigation project DID NOT adequately compensate for the impacts.**

Overall Success and Possible Factors Correlated with Success

This enhancement site was considered **NOT SUCCESSFUL** (the project did not achieve the ecologically relevant measures and did not adequately compensate for the impacts). The main factors that could have determined the outcome of this project are listed below.

Contributed to success – No factors noted.

Did not contribute to success

- Heavily compacted soils;
- Inadequate funding;
- Lack of baseline hydrologic and soils baseline data;
- Maintenance and contingency measures not implemented;
- No irrigation;
- No soil amendments; and
- Some deer herbivory.

Was the mitigation site the same HGM and Cowardin class(es) as the impacts?

The mitigation site was on-site and most likely of the same HGM class (depressional) as the impact site. However, because the mitigation activities did not result in the enhancement of the wetland, the mitigation project did not provide the same HGM subclass. The impacts were to FO, SS and EM wetlands. The existing wetland proposed to be enhanced is EM and SS and therefore is not the same Cowardin Class as the impacted wetlands.

Ecological Condition

Hydroperiods

This site had areas with seasonal inundation (> 1 month) and occasional inundation (< 1 month).

Dominance by Non-Native Plant Species

At the time of the site visit, non-native species dominated 25-49% of the cover within the wetland.

Plant Species Diversity

The SAT identified 28 native species and 16 non-native species on this site.

Buffers

At the time of the site visit, this site had a moderately high quality buffer (100m of forest, scrub, relatively undisturbed grassland or open water around at least 50% of the wetland).

Corridors and Connectivity

At the time of the site visit, this site had moderate connectivity and corridors to other habitat areas (the site is part of a riparian corridor greater than 25-50m wide connecting to other wetlands with at least 30% forest and shrub in the corridor).

Land Uses

Within 1 km of the wetland mitigation area the land uses were as follows: 40% developed (36% low density residential and 4% urban/commercial), 38% undeveloped (24% undeveloped forests and 14% other undeveloped areas), and 22% agriculture.

Impact information

This project, implemented by a private entity, is located in Clark County. It entailed the filling of 1.6 acres of wetlands under a Corps NWP 26. [Note: additional wetland acres, determined to be prior converted croplands (PCC), were impacted and were not in the Corps jurisdiction.] The impacts were to several small PEM, temporarily flooded to seasonally saturated hillside seep and depression closed swale wetlands (the on-site wetlands were also mapped on the NWI as PEM seasonally flooded). Several small wetlands at the edge of the cropland contained some tree and shrub canopy.

According to the Clark County Wetlands Protection Ordinance, on-site wetlands were Category 4 “wetlands that are smaller, isolated, and less diverse vegetatively. It is possible to replace these wetlands and even improve them from a habitat standpoint. Category 4 wetlands do provide important functions and losses must be mitigated. Intermittent streams not utilized by salmonids are also included in this category.” The PCC wetlands on-site were rated Category 5, which were not regulated by the Clark County Wetlands Protection Ordinance.

Dominant vegetation and water sources

There were several small grass dominated wetlands impacted:

1. A swale wetland dominated by PHAR;
2. Hillside seep wetlands dominated by CAOB, JUEF, HOLA, FEAR, and ANOD; and
3. Others dominated by JUEF, HOLA, ALPR, *Agrostis* spp., *Ranunculus acris*, RARE, and PHAR.

The site forms the headwaters of an unnamed tributary of a river.

Functions provided

There was not a detailed description of the functions provided by the on-site wetlands.

Other details

NRCS and the Corps had to verify the delineation due to the mixed use of the site in agricultural and non-agricultural uses. Most of the area had been cleared and used to grow annual crops or as pasture. No active cultivation occurred on the site for a couple of years, however, corn was seeded on the northern portion of the site in 1991. The NRCS PCC determination applies to the agricultural wetlands on-site since they were cleared prior to 1985, have been cropped with a commodity crop at least once every 5 years since 1981, and were not inundated for 15 or more consecutive days during the growing season.

Wetland Mitigation Required/Implemented

This project required the enhancement of 6.86 acres of agriculturally degraded wetlands on-site and a 37.5-foot buffer. The wetland to be enhanced was a large headwater wetland area that ran east-west through the center of the northern portion of the site. Vegetation was dominated by PHAR. Prior to enhancement the wetlands were considered to be Category 4 “wetlands that are smaller, isolated, and less diverse vegetatively,” according to the Clark County Wetlands Protection Ordinance. The *goal* of the mitigation plan was:

- To compensate for the loss of functions of 1.6 acres of low quality wetlands through enhancement of 6.86 acres of low quality wetland and creation of a stream corridor with the associated fringe wetlands and riparian zone on the site.

More specific *objectives* outlined in the mitigation plan were as follows:

- Excavate two ponds that will each have OW and EM vegetative components along with a SS shoreline. This combination of vegetative classes will provide an increased diversity of habitat for both wetland dependent animals that currently exist on site;
- Storm water entering the enhancement area will pass through bio-filtration swales and meet the quality requirements of the Puget Sound Stormwater Manual. The ponds will provide increased water quality by allowing sediments to settle out of the storm water and removal of nutrients and toxicants through plant uptake;
- The riparian zone (stream channel and buffer zone) will provide a corridor for animal movement through this area down to the fork of the river, which this tributary empties into;
- Although, there is a small chance of flooding on this site, the ponds and fringe wetlands should protect from downstream flooding by providing storm water storage areas;
- Bat boxes and raptor perch poles will be constructed to provide these animals the opportunity to use this area;
- Large woody debris will be placed within the riparian zone to provide micro-habitats and perch areas for animals using the site; and
- An enhanced buffer zone is being provided to protect the wetland and stream corridor and provide increased plant diversity.

Major mitigation actions included:

1. Excavation of the top 18"-24" of the site to remove the mat of PHAR and the potential seed base for re-growth;
2. Excavation of two ponds and a connecting channel;
3. Planting the riparian zone with native vegetation (hydroseed in emergent areas);
4. Placement of large woody debris within the riparian zone;
5. Construction of bat boxes and raptor perch poles; and
6. Creation of biofiltration swales within the buffer zone.

Grading was completed in the late summer and planting of EM hydroseed in the fall and bare root plants in the winter. Plants were irrigated for the first growing season. The hydrologic regime was to be supported by groundwater and storm water runoff. Monitoring was required for five years to assess survivability of planted species. Replanting has occurred every year to get back to 100%.

Also, the mitigation plan stated that the proposed enhancement would raise the wetland classification from Category 4 to Category 2 wetlands (wetlands greater than five contiguous acres in size, which have two or more wetland subclasses and open water). The buffer would also be enhanced from Type D (areas with monotypic or no vegetation; or areas with a predominance of exotic species) to Type B (immature versions of Type A?).

Site Assessment Information

This site was approximately 2 years old at the time of the site visit. The SAT identified approximately 3.26 acres of enhanced wetland. This is not within the 10% margin of error for acreage establishment. They were required to enhance 6.86 acres of non-native EM wetland. It is assumed that during re-contouring of the site, upland areas were unintentionally created resulting in a loss of 3.6 acres of wetlands. The site was a depressional outflow, EM (1.79 acres), OW (0.39 acres) and AB (1.08 acres) wetland. Two ponds on either end of the site were connected via a meandering seasonally flooded channel. This site was considered an atypical HGM type because it had exaggerated morphology.

The drier areas of the site were dominated by grass spp., including *Agrostis* spp. and *Holcus* spp. The two ponds were dominated by TYLA and SCAC, with some ELPA and *Sparganium* spp. A couple of *Potamogeton* spp. also dominated the ponds. Wild rice has become more abundant in the eastern pond area as well.

Wildlife observations included: a belted kingfisher, male and female American kestrel nesting in a snag, barn swallow, red-wing blackbird, bullfrogs, tree frogs, rat or field mouse (dead), American crows, song sparrows, olive-sided flycatcher, American goldfinch, cedar wax wings, lazuli bunting, dragonflies, swallow-tail butterfly, and an orange sulfur butterfly.

This site was considered a Category 3 (21 points) wetland according to the WA State Wetland Rating System for Western Washington (see footnote 1 p. 3).

A 37.5 foot forested buffer zone was proposed. A forested buffer has not been established and will not establish unless it is replanted because survival was minimal at best.

Site Evaluation Results

Did the mitigation project achieve the ecologically relevant measures?

1. The mitigation project did not establish the acreage (within 10%) for the required mitigation activity (3.26 acres established / 6.86 acres required); **NO**
2. This project had two performance standards (P.S.):
 - Two of the P.S. were assessed during Phase 2;
 - None of the assessed P.S. were attained (0%);
 - One of the assessed P.S. was considered to be significant; and
 - The significant P.S. was not attained (0%).

Therefore, this project did not attain the significant P.S.; and **NO**

3. This project did not fulfill the appropriate goals and objectives. The site did not meet the area goal, there was no SS habitat established along the shoreline, the buffer was not enhanced, and there was not a riparian zone for animal movement. A few objectives that were fulfilled, but were not considered significant, were the placement of large woody debris, perch poles and bat boxes throughout the wetland. **NO**

Based on the above, **the mitigation was determined to be NOT achieving the ecologically relevant measures.**

Phase 1 comparison – This mitigation project was determined to not be built to plan (there was no as-built available) in Phase 1. Grading was not completed as planned and some of the habitat structures were not present. The two assessed P.S. were not attained in Phase 1 or Phase 2 (0%). This project was determined to be not in compliance in Phase 1.

Did the mitigation project adequately compensate for the impacts?

The following table provides an overview of the results from the function assessment evaluations. Due to a lack of detailed information on the pre-enhancement sites potential to perform functions, the site evaluation team used the physical description of the characteristics and structure of the wetland and relied on expert knowledge to determine the level of functioning prior to enhancement activities. This was done using the approach for decision-making (See footnote 2 p. 5).

FUNCTION	Pre-P.	Poten.	Oppor.	Contri.	Comments
Sediments	MH	MH	H	NAA	Ponds increase, but lost wetland area for this to be performed. Net result =No change.
Nutrients	M	M	H	NAA	Performing at this level before.
Metals/toxic organics	M	MH	H	MOD	Added standing water, which decreased pH.
Peak flows	L	ML	H	MOD	Excavated, deeper water provides some storage.
Downstream erosion	L	ML	H	MOD	Excavated, deeper water provides some storage.
General habitat	L	M	L	MIN	
Invertebrates	L	M	-	MOD	
Amphibians	L	L	-	NAA	Performed at this level before. Also, bull frogs present.
Anadromous fish	L	M	L	MIN	No access
Resident fish	L	M	-	MOD	
Wetland assoc. birds	L	M	-	MOD	
Wetland assoc. mammals	L	M	-	MOD	
Native plant richness	L	M	-	MOD	Went from PHAR to 56 natives.
Primary prod/export	M	MH	-	MIN	

*Pre-P. = pre-potential of the site to perform a function; Poten. = current potential of the site to perform a function; Oppor. = opportunity of the site to perform function; Contri. = contribution of mitigation activities to the performance of a function.

*NA = Not Applicable; L = Low; ML = Moderately low; M = Moderate; MH = Moderately high; H = High.

*NAA = Not at all contributing; MIN = Minimal contribution; MOD = Moderate contribution; HI = High contribution.

Summary of Functions

- *Water quality* – Moderately high potential, Minimal contribution
- *Water quantity* – Moderately low potential, Moderate contribution
- *General habitat* – Moderate potential, Minimal contribution

Overall Rationale

This project resulted in impacts to 1.6 acres of PHAR dominated wetlands. The mitigation activities were to result in the enhancement of 6.86 acres of existing wetlands. The SAT identified 3.26 acres of wetlands on-site. Grading and excavation resulted in an apparent loss of 3.6 acres of wetlands in addition to the 1.6 acres of wetlands impacted for the development.

In the areas that were determined to be wetland, the mitigation activities had a moderate contribution to water quantity functions by excavating two deep ponds at either end of the site, which provide some storage in an area with a high opportunity to perform this function. The mitigation activities had a minimal contribution to the other functions and may have even contributed negatively to water quality functions by allowing storm water to enter the site. Water quality functions were the main functions that were lost and the mitigation activities had a minimal contribution to water quality functions. Also, the opportunity for the site to provide general habitat functions is minimal due to the small width of the buffers and the surrounding development. The mitigation activities, therefore, did not replace the functions lost, but did provide an exchange of functions by providing water quantity functions. The mitigation activities (grading) appear to have resulted in the loss of wetland area on the site resulting in an overall decrease in wetland functions provided by the site. **It was determined that this mitigation project DID NOT adequately compensate for the impacts.**

Overall Success and Possible Factors Correlated with Success

This enhancement project was considered **NOT SUCCESSFUL** (the project did not achieve the ecologically relevant measures and did not adequately compensate for the impacts). The main factors that could have determined the outcome of this project are listed below.

Contributed to success

- Hydroseed mix worked well for native plant diversity; and
- Excavation of PHAR seemed to work.

Did not contribute to success

- Compaction of soil;
- Lack of soil nutrients resulted in high plant mortality (lack of thriving);
- Poor grading (may have resulted in more loss of wetland area); and
- Lack of experience of excavator operator.

Was the mitigation site the same HGM and Cowardin class(es) as the impacts?

Most of the impacts were to depression closed EM wetlands. The mitigation site is a depression outflow, EM, OW and AB wetland with exaggerated morphology (pre-enhancement the site was a swale). Thus, it is of an atypical HGM subclass and is not the same as the impact site. The enhanced area was once all EM and some areas are now OW and AB. Therefore, the mitigation site was partly the same Cowardin class as the impact. The mitigation activities resulted in 5.07 acres of EM loss as a result of conversion to OW, AB and upland (due to grading and recontouring of the site).

Ecological Condition

Hydroperiods

This mitigation site had areas with permanent inundation and seasonal flooding or inundation (> 1 month).

Dominance by Non-native Plant Species

At the time of the site visit, non-native species dominated 1-24% of the cover within the wetland.

Plant Species Diversity

The SAT identified 56 native species and 14 non-native species on this site.

Buffers

At the time of the site visit, this site had a low quality buffer (have paved roads within 25m around at least 5% of the wetland).

Corridors and Connectivity

At the time of the site visit, this site did not have any corridors or connections to other habitat areas.

Land Uses

Within 1 km of the wetland mitigation area the land uses were as follows: 31 % developed (22% high density residential, 7% low density residential, and 2% urban/commercial), 38% undeveloped (25% undeveloped forests and 13% other undeveloped areas), and 31% agriculture.

Impact information

This project, implemented by a private entity, is located in Snohomish County. It entailed the filling of 1.54 acres of wetlands under a Corps NWP 26. The impacts were to a PEM, seasonally flooded slope wetland system. There was no wetland rating available for the impacted wetlands.

Dominant vegetation and water sources

Vegetation was dominated by JUEF, which provided 80% cover in some places, and pasture grasses. The wetlands were associated with groundwater seepage. On-site wetlands had a long history of drainage and use as a pasture/hayfield.

Functions provided

According to the mitigation plan for this project, the wetlands discharged groundwater via seeps and contributed water during peak rain events. EM vegetation took up available nutrients, but the wetlands were too sloped to trap sediments and toxicants. The wetlands provided forage for songbirds and small mammals.

Wetland Mitigation Required/Implemented

This project required the creation of 2.03 acres of wetlands on-site, in two areas (A & B), and the enhancement (incorporation) of 0.32 acres of wetlands in one of the areas. In addition, 2.27 acres of upland buffer was required. The *goals* of the mitigation plan were:

- To provide 1:1.25 replacement of wetland acreage by creating two new wetland areas;
- To provide an upland buffer for the created wetlands; and
- To produce the following plant associations: Douglas-fir forest, red alder/black cottonwood patches, Pacific willow SS/FO patches, EM/aquatic marsh, and patches of grassy meadow.

The created wetlands were designed to detain larger volumes of water and to provide greater diversity of wildlife habitat than the JUEF dominated wet meadow that was impacted. The proposed Cowardin classification of the mitigation areas was PFO, PSS and PEM.

Major mitigation actions included:

1. Excavation and regrading to create various vegetated islands and berms;
2. Dense planting; and
3. Water routing via installation of a series of french drains to intercept surface and groundwater moving through the sloped portion of the site (there are two separate wetland areas that are separated by a road).

The overall strategy was to reproduce a matrix community typical of early successional stages of vegetation in the Pacific Northwest.

Plantings were done in the spring and early summer. Due to heavier than expected stormwater inputs, the water level of Area B was about a foot higher than its target elevation, therefore planting was completed later than expected. Islands were to be planted with clumps (CAOB, OESA, SCAC, ELPA, SCMI, ALPL-AQ), whips (POTRI, SALA), bare root (ALRU, PSME, THPL), and seeds (DECE, LOMU, FERU). A mass planting strategy (plant in large, dense quantities) was implemented on this site. Plantings were maintained by mechanically clearing weeds and grasses from around the plants. Water levels in both areas were controlled by the

elevation of a notch in a log weir. Monitoring was required for five years to assess revegetation success and to provide photodocumentation.

Site Assessment Information

This site had two areas that were completed at different times. Area A was approximately 3 years old at the time of the site visit and Area B was approximately 2 years old at the time of the site visit. The SAT identified approximately 3.14 acres (2.82 acres of creation and 0.32 acres of enhancement) of wetland. [Note: Mitigation also included the establishment of 2.27 acres of buffer, which we did not assess.] They were required to create 2.03 acres of wetland. The SAT was unable to determine if the additional 0.79 acres that was created was at the expense of buffer. The SAT did note that there was pretty good survival of planted species in the buffer area. It was determined that the combined acreage of the two areas was within the 10% margin of error for acreage establishment.

There are two mitigation areas for this project:

- Area A (1.52 acres) is a SS (0.36 acres), EM (0.81 acres) and AB (0.35 acres) wetland. At the time of the site visit, the vegetation in the SS areas had nearly attained the height required for the FO class (>20 feet). This area is a depressional outflow wetland. It is considered atypical for two reasons: water levels are controlled via a weir and depressions in a slope are typically not natural in this landscape setting. The dominant vegetation species in Area A were ALRU, *Salix* spp., SCAC, SCMI, CAST, JUEF, and TYLA. Aquatic bed species were *Utricularia* spp. (flowering), *Potamogeton* spp., and *Alisma* spp. Area A has standing water throughout the year, ranging in depth from 2 feet to a few inches. This site was considered to be a Category 2 (23 points) wetland according to the WA State Wetland Rating System for Western Washington (see footnote 1 p. 3).
- Area B (1.62 acres) is an EM wetland. There were small areas of SS vegetation, which were not large enough to be counted as a Cowardin class. Area B is also a depressional outflow wetland. It is considered atypical for two reasons: water levels are controlled via a weir and the banks had exaggerated morphology (steep sides). Area B was dominated by TYLA and TYAN. In the southern area, which had longer duration inundation, there were pockets of *Salix* spp. with SPEM, ELPA, JUEF, *Alisma* spp., SCMI, and SCAC. The other end was much drier with bare ground. Area B receives surface water inputs from numerous sources including roadside stormwater (off-site), stormwater detention ponds on-site, Area A (on-site), and from overflow in the case of flooding. Water depths range from two feet during the wettest part of the year to pockets of soil saturation during the driest parts of the year. Water that spills over the control weir is discharged from the wetland via a culvert. This site was considered to be a Category 3 (9 points) wetland according to the WA State Wetland Rating System for Western WA (see footnote 1 p. 3).

Wildlife observations included: song sparrows, Cedar waxwings, red-wing blackbirds, red-tail hawks (2 adults and 2 fledglings), common snipe, American robin, cowbirds, European starling, house finch, barn swallow, warbler spp., violet-green swallow, and tree frogs, and red-legged frogs (Phase 1). Within 20m we observed an American goldfinch, turkey vulture, flicker, rock dove, and a sharpshin hawk.

Problems included mice damage in the form of trunk girdling in the grassy meadow area and encroachment of blackberries.

Site Evaluation Results

Did the mitigation project achieve the ecologically relevant measures?

1. The mitigation project established the acreage (within 10%) for the required mitigation activity (3.14 acres established / 2.35 acres required); **YES**
2. This project had three performance standards (P.S.):
 - Two of the P.S. were assessed during Phase 2;
 - One of the assessed P.S. was attained (50%);
 - Both of the assessed P.S. were considered to be significant; and
 - One of the significant P.S. was attained (50%).

Therefore, this project somewhat attained the significant P.S; and

SOMEWHAT

3. This project fulfilled the appropriate goals and objectives. The mitigation provided greater than 1.25:1 replacement and provided the necessary plant associations. Buffers were present, although the SAT did not assess them. **YES**

Based on the above, **the mitigation project was determined to be SOMEWHAT achieving the ecologically relevant measures.**

Phase 1 comparison - This mitigation project was determined to be built to plan in Phase 1. Of the 3 P.S. for this mitigation project two could be assessed with the Phase 1 methods. Both of the P.S. were met (100%). [Note: One of the standards that was met in Phase 1 was not attained in Phase 2.] This project was determined to be in compliance in Phase 1.

Did the mitigation project adequately compensate for the impacts?

The following tables provide an overview of the results from the function assessment evaluations. Both areas were considered atypical (HGM type) depressional outflow wetlands. The scores from the function assessment models for typical depressional outflow wetlands could not be used. Therefore, the potentials were determined based on the data/characteristics collected on the function assessment forms rather than the calculated scores.

Area A

FUNCTION	Pre-P.	Poten.	Oppor.	Contri.	Comments
Sediments	NA	MH	L	HI	
Nutrients	NA	ML	H	HI	
Metals/toxic organics	NA	M	H	HI	
Peak flows	NA	M	M	HI	
Downstream erosion	NA	M	M	HI	
General habitat	NA	M	L	MOD	
Invertebrates	NA	MH	-	HI	
Amphibians	NA	M	-	HI	
Anadromous fish	NA	ML	L	MIN	
Resident fish	NA	ML	-	MOD	
Wetland assoc. birds	NA	M	-	HI	
Wetland assoc. mammals	NA	L	-	MIN	
Native plant richness	NA	M	-	HI	
Primary prod/export	NA	MH	-	HI	

*Pre-P.= pre-potential of the site to perform a function; Poten. = current potential of the site to perform a function; Oppor. = opportunity of the site to perform function; Contri. = contribution of mitigation activities to the performance of a function.

*NA = Not Applicable; L = Low; ML = Moderately low; M = Moderate; MH = Moderately high; H = High.

*NAA = Not at all contributing; MIN = Minimal contribution; MOD = Moderate contribution; HI = High contribution.

Area B

FUNCTION	P.Pot.	Poten.	Oppor.	Contri.	Comments
Sediments	NA	MH	H	HI	
Nutrients	NA	M	H	HI	
Metals/toxic organics	NA	M	H	HI	
Peak flows	NA	M	H	HI	
Downstream erosion	NA	M	H	HI	
General habitat	NA	L	L	*MIN	*This reflects the average contribution for the other species specific habitat contributions.
Invertebrates	NA	ML	-	MOD	
Amphibians	NA	ML	-	MOD	
Anadromous fish	NA	L	L	NAA	
Resident fish	NA	L	-	MIN	
Wetland assoc. birds	NA	ML	-	MOD	
Wetland assoc. mammals	NA	L	-	MIN	
Native plant richness	NA	ML	-	MOD	
Primary prod/export	NA	MH	-	HI	

Summary of Functions for Area A

- *Water Quality* – Moderate potential, High contribution
- *Water Quantity* – Moderate potential, High contribution
- *General Habitat* – Moderate potential, Moderate contribution

Summary of Functions for Area B

- *Water Quality* – Moderate potential, High contribution
- *Water Quantity* – Moderate potential, High contribution
- *General Habitat* – Low potential, Minimal contribution

Overall Rationale

This project resulted in impacts to 1.54 acres of EM slope wetlands. The mitigation activities resulted in the creation of 2.82 acres of wetlands and enhancement of 0.32 acres of wetlands. The mitigation area replaced the lost wetland area and functions associated with the lost wetland area at an almost 2:1 ratio. The mitigation activities also resulted in a high contribution to the potential of the site to perform water quality and water quantity functions that were not being performed to a significant extent by the filled slope wetlands. The created wetlands provided additional functions, including peak flow reduction and flood alteration that were determined to be regionally necessary. The mitigation had a minimal contribution to wildlife habitat, but provided this at an almost 2:1 ratio. **It was determined that this mitigation project adequately COMPENSATED for the impacts.**

Overall Success and Possible Factors Correlated with Success

This creation project was considered **MODERATELY SUCCESSFUL** (the project somewhat achieved the ecologically relevant measures and adequately compensated for the impacts). The main factors that could have determined the outcome of this project are listed below.

Contributed to success

- Continuity - the same experienced consultant was involved throughout the entire project (delineation, mitigation plan, implementation, monitoring and maintenance);
- Adequate hydrologic source;

- The use of sterile subsoil rather than topsoil;
- Ongoing maintenance; and
- The technique of using a wrapped berm on a hillside to create a wetland basin.

Did not contribute to success

- Area B was wetter than expected (did not allow for establishment of scrub-shrub vegetation on the proposed islands), and therefore did not attain the P.S. for required scrub-shrub cover.

Were the mitigation sites the same HGM and Cowardin class(es) as the impacts?

The mitigation project resulted in the creation of two depressional outflow wetlands, while the HGM subclass of the filled wetlands was slope. In addition, the mitigation sites were of an atypical HGM subclass because the morphology of the depressions was exaggerated and the water levels were controlled by a weir. A typical HGM subclass for this project's landscape position would have been a slope wetland. The mitigation wetlands consisted of EM, SS, and AB with some OW, whereas the wetlands lost were EM. The mitigation was somewhat the same Cowardin classes as the impacts.

Ecological Condition

Hydroperiods

Both Areas A and B had areas with seasonal flooding or inundation (>1 month). Area A also had areas with permanent inundation and saturation (seldom inundated).

Dominance by Non-Native Plant Species

At the time of the site visit, non-native species dominated 1-24% of the cover within both Areas A and B.

Plant Species Diversity

The SAT identified 36 native species and 9 non-native species in Area A and 29 native species and 9 non-native species in Area B.

Buffers

At the time of the site visit, both wetland areas had low quality buffers (have paved roads within 25m around at least 5% of the wetland).

Corridors and Connectivity

At the time of the site visit, neither area had any corridors or connections to other habitat areas.

Land Uses

Within 1 km of the wetland mitigation areas the land uses were as follows: 63% developed (21% high density residential, 16% low density residential, and 26% urban/commercial), 17% undeveloped areas (8% undeveloped forests and 9% other undeveloped areas) and 20% agriculture.

Impact Information

This project, implemented by a public entity, is located in Benton County. It entailed the filling of 0.13 acres of wetland adjacent to the Columbia River under a Corps Individual Section 404 (Clean Water Act) permit. The impact was to an EM wetland that was being maintained as lawn within a park. The wetland was probably a Category 3 according to the WA State Wetland Rating System for Eastern Washington³.

Functions provided

According to the Final Environmental Assessment for this project, the value of the wetland area was established at moderately-low quality. This was determined using the Corps WET II, which is based on functional values of wetland sites.

Wetland Mitigation Required/Implemented

This project required the restoration of 0.137 acres of mowed wet lawn adjacent to the impact area and buffers (width or acreage not specified). It was later determined that the mitigation activities resulted in enhancement of the wetland and not the restoration of wetland functions since the area was delineated as a wetland. There was not a detailed mitigation plan for this project. Therefore, there were no goals and objectives described for this project.

Major mitigation actions included:

- Excavation; and
- Planting.

A consultant questionnaire was not completed for this project, therefore details concerning actual implementation of the plan are not known. Planned plantings included TYLA rhizomes, SCAC roots, *Rosa woodsii*, COSE, *Salix amygoaloides*, *Robinia pseudoacacia*, and POTRI. The site's water regime is influenced by ground water levels driven by irrigation activities in the Columbia Basin. As a result, high water, which normally occurs in the early part of the growing season, occurs in late summer on this site. Monitoring was required by the Corps for five years after completion of the mitigation work.

Site Assessment Information

This site was approximately 3(+) years old at the time of the site visit. The SAT identified approximately 0.124 acres of enhanced wetland. This is within the 10% margin of error for acreage establishment. The site was a depressional long duration EM wetland. The area of seasonal inundation consisted of 90% TYLA with SCAM and SCAC dominating the other 10%. Wildlife observations included: red-winged blackbirds nesting. This site was considered to be a Category 3 (12 points) wetland according to the WA State Wetland Rating System for Eastern Washington (see footnote 3 this page).

³Washington State Department of Ecology. 1991. Washington State Wetlands Rating System – Eastern Washington. Publication #91-58. Olympia, WA.

Site Evaluation Results

Did the mitigation project achieve the ecologically relevant measures?

1. The mitigation project established the acreage (within 10%) for the required mitigation activity (0.124 acres established / 0.137 acres required); **YES**
2. This project had one performance standard (P.S.), which was a condition of Ecology's WQC:
 - The one P.S. was assessed during Phase 2;
 - The assessed P.S. was attained (100%); and
 - The assessed P.S. was not considered significant (NA).

Therefore, an evaluation of the significant P.S. was not applicable (NA) for this site. **NA**

3. This mitigation plan did not have any goals and/or objectives. **NA**

Based on the above, **the mitigation was determined to be ACHIEVING the ecologically relevant measures.**

Phase 1 comparison– This mitigation project was determined to be not built to plan in Phase 1. Plant substitutions were made that were not reflected on an as-built (we did not have a copy of an as-built). The one P.S. for this project was assessed with the Phase 1 methods and was not met (0%). The same P.S. in Phase 2 was not considered significant. This project was determined to be not in compliance in Phase 1.

Did the mitigation project adequately compensate for the impacts?

The following table provides an overview of the results from the function assessment evaluations. The SAT filled out the function assessment forms for depressional short duration wetlands. It was later determined that the site was actually depressional long duration. Therefore, the potentials were determined based on the data/characteristics collected on the function assessment forms rather than the calculated scores. Also, the pre-potential of the site to perform functions was based on the physical description of the characteristics and structure of the wetland and relied on expert knowledge to determine the level of functioning prior to enhancement activities. This was done using the approach for decision-making (see footnote 3 p. 5).

FUNCTION	Pre-P.	Poten.	Oppor.	Contri.	Comments
Sediments	H	H	H	NAA	Was doing at a high level before (increased opportunity)
Nutrients	ML	M	H	MOD	Now better for phosphorous, before excavation better for nitrogen
Metals/toxic organics	MH	MH	H	NAA	Ash – good cation exchange
Peak flows	L	ML	L	NAA	Controlled by irrigation in the Columbia Basin
Downstream erosion	L	ML	L	NAA	
General habitat	L	M	L	MIN	
Invertebrates	L	M	L	MIN	This was a mowed wet meadow that most likely did not have the potential to provide habitat functions.
Amphibians	L	ML	L	NAA	
Anadromous fish	NA	NA	NA	NA	Closed depression
Resident fish	NA	NA	NA	NA	Closed depression
Wetland assoc. birds	L	ML	H	MOD	Adjacent to river
Wetland assoc. mammals	NA	NA	NA	NA	No permanent water
Native plant richness	L	ML	-	MIN	
Primary prod/export	L	ML	-	MIN	

*Pre-P. = pre-potential of the site to perform a function; Poten. = current potential of the site to perform a function; Oppor. = opportunity of the site to perform function; Contri. = contribution of mitigation activities to the performance of a function.

*NA = Not Applicable; L = Low; ML = Moderately low; M = Moderate; MH = Moderately high; H = High.

*NAA = Not at all contributing; MIN = Minimal contribution; MOD = Moderate contribution; HI = High contribution.

Summary of Functions

- *Water quality* – Moderately high potential, Minimal contribution
- *Water quantity* – Moderately low potential, No contribution
- *General habitat* – Moderate potential, Minimal contribution

Overall Rationale

This project resulted in impacts to 0.13 acres of mowed wet meadow. The mitigation activities resulted in the enhancement of 0.124 acres of wet meadow that had ground water influenced irrigation driven hydrology. The mitigation site was on-site and more or less in-kind. However, it was wedged between a road and a highway off ramp and is functioning primarily as a water quality or storm pond. The mitigation site did not provide the same functions as those that were lost. Rather the mitigation provided habitat in exchange for the water quantity functions lost due to the development project. The enhancement activities minimally improved another existing wetland at an almost 1:1 impact to mitigation ratio. The enhanced functions were not provided over a sufficient area to compensate for the complete loss of 0.13 acres of moderately low quality wet meadow. **It was determined that this mitigation project DID NOT adequately compensate for the impacts.**

Overall Success and Possible Factors Correlated with Success

This enhancement project was considered **MINIMALLY SUCCESSFUL** (the project achieved the ecologically relevant measures and did not adequately compensate for the impacts). The main factors that could have determined the outcome of this project are listed below.

Contributed to success

- Adequate water source (it was wetland before).

Did not contribute to success

- Site selection (size and location).

Was the mitigation site the same HGM and Cowardin class(es) as the impacts?

The mitigation site was on-site and of a different HGM subclass than the adjacent impact area. The impact was to a short duration depression and the mitigation site was a long duration depression. Excavating down closer to the groundwater table resulted in longer duration inundation (Note: > 9 months of inundation is the cut-off for the site to be considered long duration). The HGM type was not atypical because other wetlands in the Columbia basin have similar morphology, though you would not expect to find a closed long duration depression in this type of riverine setting. The mitigation site was the same Cowardin Class as the impact. The impact was to a mowed wet lawn (EM) and the mitigation site is a SCAC and TYLA dominated EM wetland.

Ecological Condition

Hydroperiods

This site had areas with seasonal inundation (2 - 9 months) and occasional inundation (< 2 months).

Dominance by Non-Native Plant Species

At the time of the site visit, non-native species dominated 1-24% of the cover within the wetland.

Plant Species Diversity

The SAT identified 16 native species and 15 non-native species on this site.

Buffers

At the time of the site visit, this site had a low quality buffer (had paved roads within 25m around at least 5% of the wetland).

Corridors and Connectivity

At the time of the site visit, this site had high connectivity and corridors to other habitat areas (the site is connected to another wetland within 1km by a relatively undisturbed vegetated corridor that is at least 5m wide, the site is also within 1km of a permanent stream, open water and other wetlands).

Land Uses

Within 1 km of the wetland mitigation area the land uses were as follows: 45% developed (24% high density residential, 6% low density residential, and 15% urban/commercial), 53% undeveloped (natural areas), and 2 % agriculture (tilled/irrigation).

Impact Information

This project, implemented by a public entity, is located in Kittitas County. It entailed the filling of 0.99 acres (0.76 acres filled and excavated and 0.23 acres flooded) of wetlands under a Corps Individual Section 404 (Clean Water Act) Permit. The impacts were to OW (0.6 acres), EM (0.3 acres) and SS (0.09 acres) riverine floodplain wetlands. The wetlands were formerly part of the river but were partially isolated by construction of railroads. One of the impacted wetlands was rated a Category 2 and three other wetlands were rated Category 3 according to the WA State Wetland Rating System for Eastern Washington (see footnote 3 p. 87).

Dominant vegetation and water sources

Vegetation in the impact areas included TYLA, *Carex* spp. and *Juncus* spp. Wetland 1 found in the former river channel had large areas of OW with PEM vegetation including TYLA, *Carex* spp., and *Scirpus* spp. in shallows throughout the wetland. Wetland 2 was a pond with TYLA and grass spp., which dominated shallows around the pond. Wetland 3 was a ditch vegetated with mature ALRU and TYLA. Wetland 4 was a gravel and cobble bottomed pond in the former channel of a river. The north side had a fringe of CAOB. The shallow west end consisted of ALRU, PREM, and POTRI with a small patch of *Carex nebraskensis*.

Functions provided

According to a Corps MFR, the functions and values associated with the impacted wetlands included flood storage, groundwater recharge, and wildlife habitat (mostly riparian wildlife and fish habitat functions).

Wetland Mitigation Required/Implemented

This project required the creation of 1.92 acres (0.72 acres EM and SS and 1.2 acres OW) of wetlands and the restoration of 0.55 acres (0.07 acres EM and SS and 0.48 acres OW) of wetlands for a total of 2.47 acres of required wetland mitigation. There were three mitigation areas developed for this project. A 75-foot buffer was also required with buffer averaging allowed. The overall *goal* of the mitigation project was:

- To establish 0.72 acres of new EM wetland and 1.2 acres of new OW and to restore 0.07 acres of EM wetland and 0.48 acres of OW that was disturbed by construction.

Specific *objectives* included:

- The new OW and most of the new EM wetland will be constructed as the flow channel from the development to Wetland S. A fringe of trees and shrubs will be planted along the upland edge of the channel and emergent wetland to promote rapid development of riparian habitat;
- Additional OW habitat will be created by excavating a channel at the northeast end of Wetland S to provide conveyance of the flow from the development without increasing the water level as Wetland S and by inundating 10, 000 square feet of EM and SS wetland in Wetland A; and
- Additional EM wetland and riparian fringe will be constructed at the north creek crossing of Wetland A.

Note: There were many habitat features included in the mitigation plan, however there were no goals or objectives for wildlife habitat. Ecology put Water Quality Certification (WQC) conditions related to wildlife habitat in the mitigation plan and clarified that vegetative coverage shall be based on coverage of native, non-invasive wetland species.

Major mitigation actions included:

1. Excavation; and
2. Planting and installation of habitat features, including large woody debris and several angular rock-filled depressions for snake refugia.

Grading was completed in the summer and plantings in the fall (hydroseeded) and spring (hand planting). Regrading was done in a couple of areas that were graded too high. The water regime was supported by the discharge of deep artesian groundwater and shallow seepage from the river. Water levels are directly correlated with water elevations in the river. Controlled discharge from the on-site development is a primary source of water. The discharge water is subject to the limits set in a National Pollutant Discharge Elimination System (NPDES) permit and is not to exceed state water quality standards. Monitoring is required for 10 years. Permanent transect lines are used to determine percent cover of EM vegetation. Trees and shrubs were counted to determine survival.

Site Assessment Information

This site was approximately 3 years old at the time of the site visit. The SAT identified approximately 1.4 acres (0.52 EM, 0.88 OW/AB) of created wetland. This was not within the 10% margin of error for acreage establishment.

There are three mitigation areas for this project:

- One of the three areas had not been restored (revegetated successfully) as specified in the mitigation plan.
- A second restoration area was washed out by unusually high flows in 1998 as evidenced by a bent staff gauge and debris, leaving a few sparse CAOB. Contingency actions were to be implemented, including reinforcing the grounds with natural fill material and replanting with species with more vigorous rooting mass and tolerance for high flow.
- The third area was a riverine impounding, EM, OW and AB wetland that had a controlled inflow from the on-site development. Low log weirs also control surface flows in the channel. Vegetation was dominated by ALPR, AGST, *Deschampsia* spp., and JUEN. Buffer plantings had a low survival rate. Wildlife observations included: an unidentified snake (not sharp-tailed). The site was considered to be a Category 2 (34 points) wetland according to the WA State Wetland Rating System for Eastern Washington (see footnote 3 on p. 87).

Site Evaluation Results

Did the mitigation project achieve the ecologically relevant measures?

1. The mitigation project did not establish the acreage (within 10%) for the required mitigation activity (1.4 acres established / 2.47 acres required); **NO**
2. This project had six performance standards (P.S.):
 - Three of the P.S. were assessed during Phase 2;
 - Two of the assessed P.S. were attained (67%);
 - Two of the assessed P.S. were considered significant, and
 - Both of the significant assessed P.S. were attained (100%).

Therefore, this project attained the significant P.S. **YES**

3. This project somewhat fulfilled the appropriate goals and objectives. The main goal was tied to the establishment of the required mitigation acreage. The established mitigation acreage was short of the required mitigation acreage. However, the site was meeting most of its other objectives. **SOMEWHAT**

Based on the site evaluation results, **it was determined that this project was SOMEWHAT achieving the ecologically relevant measures.**

Phase 1 comparison – This mitigation project was determined to be built to plan in Phase 1. Of the six P.S., one out of one (100%) of the P.S. assessed using the Phase 1 methods was met. In Phase 2 we were able to evaluate two more of the standards, which were year 3 standards. This project was determined to be in compliance in Phase 1.

Did the mitigation project adequately compensate for the impacts?

The following table provides an overview of the results from the function assessment evaluations. The potentials and contributions listed below are for the creation area only. The SAT filled out the function assessment forms for riverine impounding wetlands because that was the model that most closely represented the site. However, there are currently no function assessment models for riverine wetlands in eastern Washington. Therefore, the potentials were determined based on the data/characteristics collected on the function assessment forms rather than the calculated scores.

FUNCTION	Pre-P.	Poten.	Oppor.	Contri.	Comments
Sediments	NA	MH	H	HI	
Nutrients	NA	NA	H	NA	Does not perform → riverine does not go anoxic
Metals/toxic organics	NA	NA	H	NA	Does not retain the fines
Peak flows	NA	NA	NA	NA	Controlled inflow in a riverine setting...
Downstream erosion	NA	NA	NA	NA	“
General habitat	NA	MH	M	HI	For the eastside
Invertebrates	NA	M	H	HI	For the eastside
Amphibians	NA	M	H	HI	
Anadromous fish	NA	MH	H	HI	
Resident fish	NA	MH	H	HI	
Wetland assoc. birds	NA	M	H	HI	
Wetland assoc. mammals	NA	M	H	HI	
Native plant richness	NA	MH	-	HI	For the eastside
Primary prod/export	NA	MH	-	HI	

*Pre-P. = pre-potential of the site to perform a function; Poten. = current potential of the site to perform a function; Oppor. = opportunity of the site to perform function; Contri. = contribution of mitigation activities to the performance of a function.

*NA = Not Applicable; L = Low; ML = Moderately low; M = Moderate; MH = Moderately high; H = High.

*NAA = Not at all contributing; MIN = Minimal contribution; MOD = Moderate contribution; HI = High contribution.

Summary of Functions

- *Water quality* – Moderately high potential (removal of sediment), High contribution
The created area is a riverine system that does not go anoxic, which limits the site’s ability to remove nutrients, metals and toxic organics.
- *Water quantity* – This site had a controlled inflow (relatively constant), therefore the potential of this site to perform this function was not applicable (NA).
- *General habitat* – Moderately high potential, High contribution

Overall Rationale

This project resulted in impacts to 0.99 acres of OW, SS, and EM wetlands. The mitigation activities resulted in the creation of 1.4 acres of OW/AB and EM wetlands. The mitigation activities resulted in the replacement of the lost acreage, as well as some of the riparian wildlife and fish functions that were impacted. However, the mitigation site did not replace the water

quantity functions (flood storage) that were lost. The mitigation area did not provide other functions in addition to, or in exchange for, functions lost. The impacted acreage was replaced, but the required acreage was not established, and neither were the required buffer plantings. Mitigation activities in the two restoration areas did not contribute to the potential of those sites to perform wetland functions.

The mitigation wetland has an artificially controlled water regime. The flow for the created riverine wetland is from effluent from the on-site development. Therefore, this system requires long term maintenance to ensure adequate hydrology. **It was determined that this mitigation project SOMEWHAT compensated for the impacts.**

Overall Success and Possible Factors Correlated with Success

This creation project was considered **MINIMALLY SUCCESSFUL** (the project somewhat achieved the ecologically relevant measures and somewhat compensated for the impacts). The main factors that could have determined the outcome of this project are listed below.

Contributed to success

- Good follow-through by consultant (did design, implementation and monitoring);
- Agency oversight;
- Adequate water source (though it is artificial); and
- Adequate funding.

Did not contribute to success

- Poor site locations for restoration areas (in a high energy, dynamic system with unusually high flows);
- Some plants were lost when the required flows from the development were not properly maintained;
- Lack of maintenance of the planted buffer (no irrigation);
- Long term maintenance of this system is required (this system is therefore not self-perpetuating or sustainable); and
- The consultant also suggested better supervision of the contractor.

Was the mitigation site the same HGM and Cowardin class(es) as the impacts?

The mitigation area was considered the same HGM type as the lost wetland area. However, since the water regime is being provided by an artificial controlled source it was determined to be of an atypical HGM type. The mitigation area was also considered the same Cowardin class as the lost wetland areas. The mitigation area is currently EM and OW/AB. A small amount of SS area was lost and will most likely be replaced by the mitigation area in the future.

Ecological Condition

Hydroperiods

This site had areas with permanent flooding or inundation, seasonal flooding or inundation (> 1 month) and a permanent stream.

Dominance by Non-Native Plant Species

At the time of the site visit, non-native species dominated 1-24% of the cover within the wetland.

Plant Species Diversity

The SAT identified 40 native species and 14 non-native species on this site.

Buffers

At the time of the site visit, this site had a moderately high quality buffer (100m of forest, scrub, relatively undisturbed grassland or open water around at least 50% of the wetland).

Corridors and Connectivity

At the time of the site visit, this site had high connectivity and corridors to other habitat areas (the site is part of a riparian corridor greater than 50m wide connecting 2 or more wetlands within 1 km with at least 30% shrub or forest cover in the corridor).

Land Uses

Within 1 km of the wetland mitigation area the land uses were as follows: 15% developed (urban/commercial), 82% undeveloped (63% undeveloped forests and 19% other undeveloped areas), and 3% agriculture.

Impact Information

This project, implemented by a public entity, is located in Spokane County. It entailed the filling of 0.141 acres of wetlands under a Corps NWP 26. The impacts were to palustrine, persistent EM seasonally flooded depressional wetlands. The wetlands were considered to be Category 3 according to the WA State Wetland Rating System for Eastern Washington (see footnote 3 p. 87).

Dominant vegetation and water sources

PHAR was the dominant plant species in the wet areas. The majority of the site was mixed annual grassland. The site had been used primarily for agriculture and grazing. Most of the site sits on a perched water table because of the shallow bedrock conditions. The majority of the shallow depressions holding water appeared to have dried primarily due to evaporation (as evidenced by dried, cracked conditions of the clay and silt).

Functions provided

According to the City's Special Use Permit for this project, the principal functions of the disturbed wetland appeared to be life support for the surrounding ecosystem and an increase in water quality through soil filtration/groundwater recharge.

Note: There were additional wetland impacts that were not considered jurisdictional and thus went unmitigated. A total of 0.995 acres of wetlands were impacted. Two wetlands that were not considered jurisdictional were Category 4 wetlands.

Wetland Mitigation Required/Implemented

This project required the creation of 0.144 acres of wetlands on-site. Planted buffers were also required as part of the mitigation. The *intent* was:

- To provide new wetland area of similar function and value to the impacted wetlands as well as produce a "logical extension" of the existing wetland system.

The following *goals* served to guide the creation of the new wetland area:

- Create an area of wetland that would meet or exceed the disturbed wetland areas in square footage and produce a 'no net loss' of wetlands in Wetland 'C'; and
- Closely pattern the function and value of new wetland areas after the existing wetland.

In addition, the site was to provide wildlife habitat to promote both an appreciation of natural systems and opportunities for educational observation.

Major mitigation actions included:

Placing soils and plant materials stockpiled from the filled wetland area at finished grade in the new wetland area in order to replicate the existing profile as closely as possible.

The water regime was to be supplemented with post-development treated stormwater runoff. There was no consultant questionnaire completed for this project.

Site Assessment Information

This site was approximately 5 years old at the time of the site visit. The SAT identified approximately 0.217 acres (0.144 acres creation and 0.073 acres of enhanced wetland) of

wetlands. This is within the 10% margin of error for acreage establishment. The site was a depressional long duration EM wetland.

Note: Enhancement was not a required component of the mitigation for this project. However, the mitigation activities resulted in the enhancement of an adjacent (to the creation area) of a PHAR dominated pasture wetland.

Vegetation was dominated by TYLA, SCAC, *Juncus* spp., *Eleocharis* spp., with some PHAR encroaching. *Salix* spp. dominated the shrub layer, which did provide enough cover to constitute a shrub class. It was also noted that the buffer plantings had a low survival rate.

Wildlife observations included: red-winged blackbirds, mallard, snake, and raccoon tracks. Also, observed raccoons nesting in an adjacent forested wetland area. An adjacent wetland had yellow-headed blackbirds and a deer carcass. An osprey was observed flying overhead.

The site was considered to be a Category 3 (14 points) wetland according to the WA State Wetland Rating System for Eastern WA (see footnote 3 p.87).

Site Evaluation Results

Did the mitigation project achieve the ecologically relevant measures?

1. The mitigation project established the acreage (within 10%) for the required mitigation activity (0.217 acres established / 0.144 acres required). **YES**
2. This project did not have any performance standards (P.S.) outlined in the mitigation plan. Therefore, an evaluation of the significant P.S. was not applicable (NA) for this site. **NA**
3. This project fulfilled the appropriate goals and objectives. The mitigation closely mimics adjacent wetlands and provides a “logical extension” of the existing wetland system. **YES**

Based on the above, **the mitigation was determined to be ACHIEVING the ecologically relevant measures.**

Phase 1 comparison– The mitigation project was determined to be not built to plan in Phase 1. This was mainly due to the status of the buffer plantings. Several areas of buffer were to be planted in phases. In some areas there was no evidence of plantings. There were no P.S. for this project. This project was determined to be not in compliance in Phase 1.

Did the mitigation project adequately compensate for the impacts?

The following table provides an overview of the results from the function assessment evaluations. The scores from the function assessment models for depressional long duration wetlands could not be used due to the small size (< 0.25 acres) of the mitigation area. Therefore, the potentials were determined based on the data/characteristics collected on the function assessment forms rather than the calculated scores. The pre-potential of the site to perform functions was based on the physical description of the characteristics and structure of the wetland prior to mitigation activities (since part of the mitigation area was determined to be wetland before) and relied on expert knowledge to determine the level of functioning prior to enhancement activities. This was done using the approach for decision-making (see footnote 2 on p. 5).

FUNCTION	Pre-P.	Poten.	Oppor.	Contri.	Comments
Sediments	M	MH	H	MOD	
Nutrients	ML	M	M	MIN	
Metals/toxic organics	L	ML	H	MOD	
Peak flows	L	M	H	HI	
Downstream erosion	L	M	H	HI	
General habitat	L	ML	M	*MOD	*This reflects the contribution for the other species specific habitat contributions.
Invertebrates	L	M	H	HI	
Amphibians	L	M	H	HI	Not long enough duration before to potentially perform this function.
Anadromous fish	NA	NA	NA	NA	
Resident fish	NA	NA	NA	NA	
Wetland assoc. birds	L	ML	M	MIN	
Wetland assoc. mammals	NA	NA	NA	NA	No permanent water
Native plant richness	L	MH	-	HI	
Primary prod/export	ML	MH	-	MOD	

*Pre-P. = pre-potential of the site to perform a function; Poten. = current potential of the site to perform a function; Oppor. = opportunity of the site to perform function; Contri. = contribution of mitigation activities to the performance of a function.

*NA = Not Applicable; L = Low; ML = Moderately low; M = Moderate; MH = Moderately high; H = High.

*NAA = Not at all contributing; MIN = Minimal contribution; MOD = Moderate contribution; HI = High contribution.

Summary of functions

- *Water quality* – Moderate potential, Moderate contribution
- *Water quantity* – Moderate potential, High contribution
- *General habitat* – Moderately low potential, Moderate contribution

Overall Rationale

This project resulted in permitted impacts of 0.141 acres of EM (mixed grass) wetlands. The mitigation activities resulted in the creation of 0.144 acres and enhancement of 0.073 acres of wetlands. The mitigation activities replaced the lost wetland area at a slightly greater than 1:1 mitigation to impact ratio. The mitigation activities resulted in an exchange of functions (short duration depressional wetlands for long duration depressional wetlands). Water quality functions were replaced, seasonal short duration invertebrate habitat was exchanged with seasonal long duration invertebrate habitat, and the mitigation activities increased the potential of the site to provide habitat for amphibians. The mitigation activities provided a moderate to high contribution to the sites potential to perform wetland functions. The project resulted in the transformation of a PHAR dominated area into a more diverse (in structure and species composition) area. **It was determined that this mitigation project adequately COMPENSATED for the impacts.**

Overall Success and Possible Factors Correlated with Success

This creation project was determined to be **FULLY SUCCESSFUL** (the project achieved the ecologically relevant measures and adequately compensated for the impacts). The main factors that could have determined the outcome of this project are listed below.

Contributed to success

- Adequate water;
- Connectivity to existing wetlands and native seed sources; and
- Good site selection and plan design (not overengineered).

Did not contribute to success - No factors noted.

Was the mitigation site the same HGM and Cowardin class(es) as the impacts?

The mitigation project was not the same HGM subclass as the filled wetlands. The mitigation wetland is a long duration (inundated > 9 months) depressionnal wetland and the impacts were to short duration depressionnal wetlands. The morphology of the created and enhanced wetland is typical of the area, with adjacent wetlands being similar. The mitigation area is the same Cowardin class (EM) as the lost wetlands.

Ecological Condition

Hydroperiods

This site was seasonally inundated (> 2 months).

Dominance by Non-Native Plant Species

At the time of the site visit, non-native species dominated 1-24% of the cover within the wetland.

Plant Species Diversity

The SAT identified 19 native species and 8 non-native species on the site.

Buffers

At the time of the site visit, this site had a moderate quality buffer (100m of relatively undisturbed naturally vegetated areas, rock areas, or open water > 25% circumference).

Corridors and Connectivity

At the time of the site visit, this site had high connectivity and corridors to other habitat areas (the site is connected to another wetland within 1km by a relatively undisturbed vegetated corridor that is at least 5m wide).

Land Uses

Within 1 km of the wetland mitigation area the land uses were as follows: 44% developed (35% high density residential, 6% low density residential, and 3% urban/commercial), 55% undeveloped (natural areas), and 1% agriculture (untilled-pasture, grazing).

Impact Information

This project, implemented by a public entity, is located in Ferry County. It entailed the filling of 0.935 acres of wetlands under a Corps Individual Section 404 (Clean Water Act) permit. There were a total of 52 wetlands impacted. They ranged in size from .0007 acres to .1161 acres. There was 0.06 acres of PEM, 0.225 acres PSS and 0.65 acres PFO wetlands impacted.

According to the delineation report for this project, there were six wetland “types” identified:

1. Riparian wetlands within and adjacent to the 100-year floodplain of the river and its tributaries;
2. Remnants of riparian wetlands isolated from the 100-year floodplain of the river by previously placed railroad ballast;
3. Wetlands created by excavation of borrow for railroad ballast and with seasonal surface water connection to the 100-year floodplain of the river;
4. Wetlands created by excavation of borrow for railroad ballast and isolated from the 100-year floodplain of the river;
5. Cultivated, wet meadow, hay fields within and adjacent to the 100-year floodplain of the river; and
6. Naturally occurring wetlands isolated from the 100-year floodplain of the river and supported by a seasonal high water table.

Functions provided

According to the mitigation plan, the wetlands represent small systems, linear and adjacent to the road, having minimal functional value.

Wetland Mitigation Required/Implemented

This project required the enhancement of 9.5 acres of wetlands off-site. The enhancement area was the site of a former FO wetland along the lower portion of a tributary to the river where the impacts occurred. The site had been deforested by continued burning over the previous 15 years by a private landowner. The *goals* of the enhancement project were to:

- Upgrade the wetland quality by reintroducing native trees and shrubs;
- Improve wildlife habitat by converting a monotypic stand of reed grasses into a diverse native plant community;
- Promote ecological awareness by constructing an interpretive trail; and
- Protect the area from future degradation.

Later, in a revision to the plan, the interpretive trail and bridges were omitted from the plan for the southern 5.2 acres of the site. No park development activity was to occur in this area and the area would serve only as a fish and wildlife reserve and wetland site. The hope was that the site would develop in to a PFO wetland area.

Major mitigation actions included:

1. Planting with native plant species specifically associated with the surrounding riparian areas.

The water regime was to be supported by the creek. Monitoring was required for 5 years to measure the number, variety and health of the plants twice a year, to identify the presence of wildlife and the condition of physical features. A consultant questionnaire was not completed for this site. However, according to a couple of status reports submitted during the monitoring

period, plantings were completed in the spring. It was stated that peak flows and deer browsing resulted in a survival of 10-15% of the initial plantings. The report also stated that the impact of reed grasses on the mitigation efforts was underestimated. Additional plantings were installed, however, unusually high peak flows caused the stream channel to shift. The 1997 status report recommended allowing the plant community on the site to continue to evolve without additional plantings of trees and shrubs.

Other required mitigation for the project impacts included restoration of 1 mile of the riparian zone, including fencing out the livestock, on the east bank of the river. The site has been degraded by unrestricted livestock access and timber cutting. Any attempts to establish native vegetation and stabilize the bank have not been successful in this area.

Site Assessment Information

This site was approximately 7 years old at the time of the site visit. The SAT identified approximately 8.01 acres of existing wetlands. The enhancement activities for this project were not successful. They failed to establish the required plantings. Therefore, the mitigation project resulted in 0 acres of wetland enhancement. This was not within the 10% margin of error for acreage establishment. The site was a riverine flow-through EM wetland with a permanent stream. Vegetation was dominated by PHAR.

Wildlife observations included: swallowtail butterfly, blue butterfly spp., fritillary butterfly spp., ringlet butterfly spp., Sarah's Orange Tip butterfly, copper butterfly spp., Milbert's Tortoise Shell butterfly, garter snake, Eastern kingbird, western wood peewee, song sparrow, cowbird, cedar waxwing, yellow warbler, killdeer, spotted sandpiper, Brewer's blackbird, Bullock's Oriole, Lewis' woodpecker (nesting), catbird.

This site was considered a Category 3 (20 points) wetland according to the WA State Wetland Rating System for Eastern WA (see footnote 3 p. 87).

Site Evaluation Results

Did the mitigation project achieve the ecologically relevant measures?

1. The mitigation project did not establish the acreage (within 10%) for the required mitigation activity (0 acres of enhancement established / 9.5 acres required). **NO**
2. This project had one performance standard (P.S.):
 - The one P.S. was assessed during Phase 2;
 - The assessed P.S. was not attained (0%);
 - The assessed P.S. was considered significant; and
 - The significant P.S. was not attained (0%).

Therefore, this project did not attain the significant P.S. **NO**

3. This project did not fulfill the appropriate goals and objectives. **NO**

Based on the above, **it was determined that the mitigation area was NOT achieving the ecologically relevant measures.**

Phase 1 comparison-It could not be determined whether the mitigation project was built to plan in Phase 1. There was no way to determine if they followed the original planting plan due to impacts from flooding. The one P.S. for this project was assessed but was not met (0%) using the Phase 1 methods. The same P.S. was not attained in Phase 2. This project was determined to be not in compliance in Phase 1.

Did the mitigation project adequately compensate for the impacts?

The following table provides an overview of the results from the function assessment evaluations. Due to a lack of detailed information on the pre-enhancement sites potential to perform functions, the site evaluation team used the physical description of the characteristics and structure of the wetland and relied on expert knowledge to determine the level of functioning prior to enhancement activities. This was done using the approach for decision-making (see footnote 2 p. 5).

FUNCTION	Pre-P.	Poten.	Oppor.	Contri.	Comments
Sediments	H	H	H	NAA	
Nutrients	NA	NA	NA	NAA	Does not have the potential to perform this function
Metals/toxic organics	NA	NA	NA	NAA	“
Peak flows	H	H	H	NAA	
Downstream erosion	L	L	H	NAA	
General habitat	ML	ML	M	NAA	
Invertebrates	M	M	-	NAA	
Amphibians	NA	NA	-	NAA	“
Anadromous fish	H	H	L	NAA	No opportunity due to a dam
Resident fish	H	H	M	NAA	
Wetland assoc. birds	L	L	M	NAA	
Wetland assoc. mammals	ML	ML	-	NAA	
Native plant richness	M	M	-	NAA	
Primary prod/export	MH	MH	-	NAA	

*Pre-P. = pre-potential of the site to perform a function; Poten. = current potential of the site to perform a function; Oppor. = opportunity of the site to perform function; Contri. = contribution of mitigation activities to the performance of a function.

*NA = Not Applicable; L = Low; ML = Moderately low; M = Moderate; MH = Moderately high; H = High.

*NAA = Not at all contributing; MIN = Minimal contribution; MOD = Moderate contribution; HI = High contribution.

Summary of Functions

- *Water quality* – High potential (sediment removal), No contribution
This riverine system does not go anoxic, which limits the site’s ability to remove nutrients, metals and toxic organics.
- *Water quantity* – Moderate potential, No contribution
- *General habitat* – Moderately low potential, No contribution

Overall Rationale

This project resulted in impacts to 0.935 acres of wetlands. The mitigation activities did not contribute to the potential of the site to perform wetland functions because the enhancement activities were not successful (plantings have not been established) on the 9.5 acre mitigation site. Therefore, the project did not replace or exchange any of the functions potentially provided by the impacted wetlands. There was a net loss of area and functions as a result of the development activities. In addition, any attempts to establish native vegetation and stabilize the bank as part of the off-site riparian enhancement were not successful. **It was determined that this mitigation project DID NOT adequately compensate for the impacts.**

Overall Success and Possible Factors Correlated with Success

This enhancement project was considered **NOT SUCCESSFUL** (the project did not achieve the ecologically relevant measures and did not adequately compensate for the impacts). The main factors that could have determined the outcome of this project are listed on the next page.

Contributed to success – No factors noted.

Did not contribute to success

- High peak flows;
- Voles;
- Deer browsing;
- Lack of maintenance and follow-up; and
- Insufficient plan details to address on site conditions (the site was dominated by PHAR and the enhancement plan did not address control of PHAR).

Was the mitigation site the same HGM and Cowardin class (es) as the impacts?

The HGM types of some of the impact areas were the same as the mitigation area (riverine flow-through). The wetland area that was to be enhanced is EM and OW. The impacted areas consisted of EM, SS, and FO. Therefore, the mitigation area (EM and OW) was not the same Cowardin class as the impact areas.

Ecological Condition

Hydroperiods

This site had areas with occasional flooding (< 1 month), saturation (seldom inundated) and a permanent stream.

Dominance by Non-Native Plant Species

At the time of the site visit, non-native species dominated > 75% of the cover within the wetland area.

Plant Species Diversity

The SAT identified 50 native species and 19 non-native species on this site.

Buffers

At the time of the site visit, this site had a low quality buffers (have paved roads within 25m around at least 5%).

Corridors and Connectivity

At the time of the site visit, this site did not have any corridors or connections to other habitat areas.

Land Uses

Within 1 km of the wetland mitigation area the land uses were as follows: 15% developed (10.5% low density residential and 4.5% urban/commercial), 60% undeveloped (9% undeveloped forests and 51% other undeveloped areas), and 25% agriculture.

Impact Information

This project, implemented by a public entity, is located in Spokane County. It entailed the filling of 1.87 acres of associated wetlands under a Corps Nationwide 31 (“Maintenance of Existing Flood Control Facilities”) permit. The impacts were to EM (0.63 acres) and SS (1.24 acres) riverine flow-through wetlands along the banks and in the channel of a seasonal creek. According to the Field Delineation and Evaluation Report for this project, the wetlands were rated Category 2 (0.63 acres) and Category 3 (1.24 acres) according to the Spokane County CAO.

Dominant vegetation

Most of the wetlands impacted were located on the east bank of the creek and consisted of simple herbaceous vegetation dominated by non-native weedy species.

Functions provided

Functions and values associated with the impacted wetlands included groundwater recharge, informal recreational use, and a few of the SS areas provided significant habitat value for wildlife cover.

Wetland Mitigation Required/Implemented

This project required the creation of 3.53 acres of wetlands on-site (based on ratios established under the CAO). According to the mitigation plan, created wetlands were to result from the widening of the stream channel. The general goals of the mitigation plan were:

- To protect as much of the existing wetland area as possible;
- To replace all damaged EM areas with mitigation wetlands that are 50% larger than the original;
- To replace all SS wetlands with mitigation wetlands that are twice as large as the impacted area; and
- To replicate the functions and values of any wetlands that were damaged by the project.

The proposed Cowardin classification was EM (in the creek) and SS (on the banks).

Major mitigation actions included:

1. Excavation;
2. Channel deepening;
3. Establishing herbaceous cover where there was serious damage to vegetation; and
4. Planting *Salix* spp., cottonwood, golden current, and COSE.

The planned water source was runoff from the creek, which is supported seasonally by snowmelt and rains.

According to the consultant, grading and planting took place in late autumn. Minor adjustments were made to the plan, in order to take advantage of existing site conditions. Monitoring was required for five years to include topography, species composition, percent cover of native wetland vegetation, and of invasive or non-native species, and hydrologic regime using a series of linear transects. Monitoring has been completed on schedule. No maintenance or contingency actions were implemented.

Site Assessment Information

This site was approximately 2(+) years old at the time of the site visit. The SAT identified 2.29 acres of created wetlands on-site. This was not within the 10% margin of error for acreage establishment. The site was a riverine flow-through EM wetland. Vegetation was dominated by PHAR, TAVU, TYLA, CIAR, and RUCR. Wildlife observations included: yellow warblers.

The WA State Wetland Rating System for Eastern Washington (see footnote 3 p. 87) was not applied (not applicable – NA) because the rating system questions did not apply to the linear wetland areas located along the creek.

Site Evaluation Results

Did the mitigation project achieve the ecologically relevant measures?

1. The mitigation project did not establish the acreage (within 10%) for the required mitigation activity (2.29 acres established / 3.53 acres required). **NO**
2. This project had three performance standards (P.S.):
 - All three of the P.S. were assessed during Phase 2;
 - Two of the assessed P.S. were attained (67%);
 - One of the assessed P.S. was considered to be significant; and
 - The significant P.S. was not attained (0%).

Therefore, this project did not attain the significant P.S. **NO**

3. This project somewhat fulfilled the appropriate goals and objectives. The project replaced most functions and protected as much of the existing wetland area as possible. However, the SS areas were not replaced. **SOMEWHAT**

Based on the above, **the mitigation was determined to be SOMEWHAT achieving the ecologically relevant measures.**

Phase 1 comparison – This mitigation project was determined to be not built to plan in Phase 1. We could not determine whether the plantings were done according to plan. Grading was not completed to plan (slopes were supposed to be graded at 3:1, whereas they were steeper (at about 2:1)). Of the three P.S., one out of two (50%) of the P.S. assessed using the Phase 1 methods was met. Neither of the P.S. were considered significant in Phase 2. This project was determined to be not in compliance in Phase 1.

Did the mitigation project adequately compensate for the impacts?

The following table provides an overview of the results from the function assessment evaluations. The site evaluation team determined the pre-potential of the site based on the physical description of the characteristics and structure of the wetlands and relied on expert knowledge to determine the level of functioning prior to impacts (since the mitigation for this project mostly resulted in rectification of previously existing wetlands impacted by the construction project).

The created wetlands were to be located within the channel and on the banks of the widened stream channel. There are currently no function assessment models for this type of wetland system, therefore no function assessment scores were calculated for this project. The potential of the created wetlands to perform functions was based on the physical characteristics and structure of the wetlands and on the expert knowledge of the SET. This was done using the approach for decision-making (see footnote 2 p. 5).

FUNCTION	Pre-P.	Poten.	Oppor.	Contri.	Comments
Sediments	M	MH	H	MOD	
Nutrients	NA	NA	NA	NA	Riverine flow-through wetlands do not have the potential to perform these functions.
Metals/toxic organics	NA	NA	NA	NA	“
Peak flows	MH	M	H	NEG	Channelizing the creek increased peak flows, flows move faster and are held back less...
Downstream erosion	MH	M	H	NEG	thereby increasing downstream erosion.
General habitat	M	M	L	NAA	
Invertebrates	ML	ML	L	NAA	
Amphibians	L	L	L	NAA	
Anadromous fish	NA	NA	NA	NA	Seasonal stream
Resident fish	NA	NA	NA	NA	Seasonal stream
Wetland assoc. birds	ML	M	L	NAA	
Wetland assoc. mammals	NA	NA	NA	NA	No permanent water
Native plant richness	M	ML	-	NEG	Did not replace shrubs
Primary prod/export	M	M	-	NAA	Invertebrate habitat

*Pre-P.= pre-potential of the site to perform a function; Poten. = current potential of the site to perform a function; Oppor. = opportunity of the site to perform function; Contri. = contribution of mitigation activities to the performance of a function.

*NA = Not Applicable; L = Low; ML = Moderately low; M = Moderate; MH = Moderately high; H = High.

*NAA = Not at all contributing; MIN = Minimal contribution; MOD = Moderate contribution; HI = High contribution.

Summary of Functions

- *Water quality* – Moderately high potential (removal of sediment), Moderate contribution
This riverine system does not go anoxic, which limits the site’s ability to remove nutrients, metals and toxic organics.
- *Water quantity* – Moderate potential, Negative contribution
- *General habitat* – Moderate potential, No contribution

Overall Rationale

This project resulted in impacts to 1.87 acres of EM and SS wetlands along the creek. The mitigation activities resulted in the creation of 2.29 acres of EM wetlands along the banks and the channel of the widened creek. The mitigation activities resulted in the replacement of the impact acreage, but did not replace the functions associated with the high quality SS areas that were impacted. The project did not provide an exchange of functions. The mitigation for this project mostly resulted in rectification of previously existing wetlands impacted by the construction project. The impacted wetlands will most likely go back to what they were, but the mitigation activities resulted in a net loss of SS acreage. For the most part, this project resulted in a temporal loss associated with wetland functions in the impact area, including a negative contribution to water quantity functions as a result of the widening and deepening of the channel.

It was determined that this mitigation project SOMEWHAT compensated for the impacts.

Overall Success and Possible Factors Correlated with Success

This creation project was considered **MINIMALLY SUCCESSFUL** (the project somewhat achieved the ecologically relevant measures and somewhat compensated for the impacts). The main factors that could have determined the outcome of this project are listed below.

Contributed to success

- Designer on-site during mitigation construction was beneficial for this project.

Did not contribute to success

- Hydrologic models that were used did not prove to reflect actual local conditions;
- Lack of implementation of maintenance and contingency measures; and
- Lack of irrigation of planted shrub areas.

Was the mitigation site the same HGM and Cowardin class(es) as the impacts?

The mitigation project replaced the same HGM type, but did not replace the same Cowardin classes because the SS areas were not replaced. A total of 1.24 acres of SS was not replaced but was exchanged for EM.

Ecological Condition**Hydroperiods**

This site had areas with occasional flooding (< 1 month), saturation (seldom inundated) and an intermittent stream.

Dominance by Non-Native Plant Species

At the time of the site visit, non-native plant species dominated 50-75% of the cover within the wetland.

Plant Species Diversity

The SAT identified 22 native species and 13 non-native species on this site.

Buffers

At the time of the site visit, this site had a moderately low quality buffer (no paved areas or buildings within 50m for > 50 % of the circumference).

Corridors and Connectivity

At the time of the site visit, this site had minimal connectivity and corridors to other habitat areas (the site is connected to relatively undisturbed areas with a vegetated corridor 5-50m wide).

Land Uses

Within 1 km of the wetland mitigation area the land uses were as follows: 88% developed, 3 % undeveloped, and 9% agriculture.

Impact Information

This project, implemented by a public entity, is located in Spokane County. It entailed the filling of 0.088 acres of wetlands under a Corps Individual Section 404 (Clean Water Act) permit. According to the wetland determination and impact assessment for this project, there were three small wetlands impacted. They were PFO/PSS, and broad-leaved deciduous seasonally saturated wetlands. They were small depressions with unconsolidated substrate on previous road slides where precipitation resulted in ponding rather than a high degree of percolation. There was no wetland rating provided for the impacted wetlands.

There were also temporary impacts for an access road to 0.34 acres of PEM marsh, seasonally saturated wetlands with a SS and OW component.

Dominant vegetation and water sources

Tree species included *Betula occidentalis*, PSME, and *Alnus incana*. Shrub species included CRDO, *Physocarpus opulifolius*, *Cornus glabrata*, *Philadelphus lewisii*, SYAL, COSE, *Rubus idaeus*, and RUPA. Herbs were scattered and included *Trillium petiolare*, GEMA, URDI, *Hercleum lanatum*, and SODU. Water levels on the site did not appear to be linked with water levels in the creek, but rather was supplied primarily by surface water runoff collection and detention.

Functions provided

According to the wetland determination and impact assessment for this project, functions and values provided were as follows: low value for flood control due to their small size; low value for pollution control due to the lack of certain species known for their ability to remove hydrocarbons (*Juncus* spp., *Lemna* spp., and *Scirpus* spp.); and moderate for wildlife habitat and biological support.

Wetland Mitigation Required/Implemented

This project required the creation of 0.46 acres of SS/FO wetland complex in the floodplain of a creek and restoration of an upland berm area by planting trees and shrubs. The *goal* of the mitigation plan was:

- To provide for no net loss of wetland area and functions and values.

Three specific *objectives* were:

- To provide compensation for 0.09 acres of filled wetlands by creating a wetland mitigation area of equal or higher-value about 0.46 acres in extent;
- To provide for no net loss of wetland functions and values; and
- To increase the overall wildlife habitat diversity of the site.

The water regime was to be a combination of groundwater and subsurface runoff from an adjacent slope.

Major mitigation actions included:

1. Excavation to create topographic lows adjacent to existing wetlands and the approximate level of seasonal groundwater;
2. Providing a 3:1 slope along the periphery which would gradually taper to the center; and
3. Plant in a manner that would mimic “the natural occurrence of a “mother” plant with its surrounding offspring.”

According to the consultant, excavation, including the creation of a shallow swale/water flow channel through the wetland mitigation area, was completed in the summer and planting was completed in the fall. The overall shape of the mitigation plan was altered to better fit the existing topography and some planting substitutions were made based on availability from a local native plant nursery. A couple of major flood events, including a 100-year flood event and heavy silt deposition resulted in the loss of roughly 75% of the initial plantings and the burying of the created swale/water flow channel. Subsequently, more plantings, including willow and dogwood cuttings were installed to replace some of the lost or buried plants. No further maintenance or contingency actions were implemented and there were not monitoring reports in our files. Monitoring was required for 5 years to measure percent survival and cover of planted vegetation as well as the hydrologic regime.

Site Assessment Information

This site was approximately 5 years old at the time of the site visit. The SAT identified 0 acres of wetlands on-site. The mitigation area did not meet the three wetland criteria. The plants were predominantly FAC or NI. The soils were silt loams and sandy loams with no mottles or other hydric soil indicators. Soil pits were dug to 26" and no evidence of saturation, inundation or a water table was observed. The site had characteristics of a riverine riparian community. It is believed that the area occupies a secondary floodplain, but the sandy soils allow rapid drainage such that water would not be held long enough to create wetland conditions. Therefore, this was not within the 10% margin of error for acreage establishment. We did observe areas that appeared to be scoured, which could be due to a short duration flood event. Aside from the scour, we found no evidence of hydrologic indicators or hydric soils.

Vegetation was dominated by COMA, TAVU, and PHAR.

Wildlife observations included: a song sparrow.

The SAT did not apply the WA State Wetland Rating System for Eastern WA (see footnote 3 p. 87) because it was determined that the site was not a wetland.

Site Evaluation Results

Did the mitigation project achieve the ecologically relevant measures?

1. The mitigation project did not establish the acreage (within 10%) for the required mitigation activity (0 acres established, 0.46 acres required). **NO**
2. This project had six performance standards (P.S.):
 - Five of the P.S. were assessed during Phase 2;
 - None of the assessed P.S. were attained (0%);
 - One of the assessed P.S. was considered to be significant; and
 - The significant P.S. was not attained (0%).

Therefore, this project did not attain the significant P.S. **NO**

3. This project did not fulfill the appropriate goals and objectives. Since the site was determined to not be a wetland, the goal of no net loss of wetland area and functions and values was not fulfilled. **NO**

Based on the above, **the mitigation was determined to be NOT achieving the ecologically relevant measures.**

Phase 1 comparison – This mitigation project was determined to be not built to plan in Phase 1. After collecting further background information it was determined that the overall shape of the mitigation plan was altered to better fit the existing topography and some planting substitutions were made based on availability from a local native plant nursery. Since we did not have an as-built plan we determined that this site was not built according to the mitigation plan. Of the six P.S., zero out of four (0%) of the P.S. assessed using the Phase 1 methods were met. Only one of the assessed P.S. was considered significant in Phase 2. This project was determined to be not in compliance in Phase 1.

Did the mitigation project adequately compensate for the impacts?

Overall Rationale

This project resulted in impacts to 0.09 acres of PFO/PSS wetlands. The lost wetland area and functions were not replaced. The mitigation activities did nothing to contribute to the performance of wetland functions, because the site was determined to not be a wetland. The site was dominated by COMA and TAVU. Any attempts to establish trees and shrubs were not successful. **It was determined that this mitigation project DID NOT adequately compensate for the impacts.**

Overall Success and Possible Factors Correlated with Success

This creation project was considered **NOT SUCCESSFUL** (the project was not achieving the ecologically relevant measures and did not adequately compensate for the impacts). The main factors that could have determined the outcome of this project are listed below.

Contributed to success -No factors noted.

Did not contribute to success

- Poor site selection;
- Major flood events;
- Lack of adequate baseline hydrologic monitoring;
- Lack of follow-up to replant, regrade, or implement other contingency actions;
- Lack of irrigation to ensure plant survival; and
- Lack of weed control.

Was the mitigation site the same HGM and Cowardin class (es) as the impacts?

The mitigation area was determined to not be a wetland and, therefore, was not the same HGM type or Cowardin class as the impacts. As a result of this project, 0.088 acres of FO/SS depressional wetlands were lost and not replaced.

Ecological Condition

Hydroperiods

This site did not have evidence of wetland hydrology.

Dominance by Non-Native Plant Species

At the time of the site visit, non-native species dominated >75% of the cover within the wetland.

Plant Species Diversity

The SAT identified 13 native species and 16 non-native species on this site.

Buffers

At the time of the site visit, this site had a high quality buffer (100m of forest, scrub, relatively undisturbed grassland or open water around at least 95% of the wetland).

Corridors and Connectivity

At the time of the site visit, this site had moderate connectivity and corridors to other habitat areas (the site is connected to a corridor 25-50m wide with > 30% cover of forest or shrub).

Land Uses

Within 1 km of the wetland mitigation area the land uses were as follows: 6% developed, 47% undeveloped, and 47% agriculture.

Plant List

Code	Latin Name	Common Name	Indicator Status [^]	Native/ Non-Native	# of sites	Mitigation sites (unless otherwise noted) where plant species were observed
Trees						
ACMA	<i>Acer macrophyllum</i>	Big-leaf maple	FACU	Native	3	14, 33 (upl overstory), 294
AEHI	<i>Aesculus hippocastanum</i>	Common horse chestnut	NL	Non-Native	1	116E
ALRU	<i>Alnus rubra</i>	Red alder	FAC	Native	16	9A, 9C, 14, 33 (upl overstory), 89, 116, 151, 163, 193, 233s, 239, 243, 294, 334, 378, 400A
	<i>Alnus spp.</i>	Alder spp.			3	13E-all, 29E, 41E
BEPA	<i>Betula papyrifera</i>	Paper birch	FAC*	Native	3	9C, 116E, 294
	<i>Betula spp.</i>	Birch spp.			2	233s, 29E
FRLA	<i>Fraxinus latifolia</i>	Oregon ash	FACW	Native	9	33, 89-1, 116, 151, 294, 300, 334-1, 378, 10E
PISI	<i>Picea sitchensis</i>	Sitka spruce	FAC	Native	9	14, 116W, 116E, 193, 233NW, 233s, 243, 294, 400A
PODE	<i>Populus deltoides</i> (hybrid)	Eastern cottonwood	FAC	Non-Native	1	116
POTRE	<i>Populus tremuloides</i>	Quaking aspen	FAC+	Native	6	243, 300, 378, 10E, 13E-OC, 29E
POTRI	<i>Populus balsamifera</i> var. <i>trichocarpa</i>	Black cottonwood	FAC	Native	20	9A, 9C, 14, 33, 89-1, 116, 151, 193, 233s, 233NW, 239, 243, 278, 294, 300, 378, 400, 13E, 29E, 41E
PREM	<i>Prunus emarginata</i>	Bitter cherry	FACU*	Native	2	116W, 193G
	<i>Prunus spp.</i>	Cherry spp.			1	233s
PSME	<i>Pseudotsuga menziesii</i>	Douglas fir	FACU*	Native	3	14, 378, 400A
QUGA	<i>Quercus garryana</i>	Oregon white oak	NL	Native	1	378
	<i>Quercus spp.</i>	Oak spp.			1	116E
RHPU	<i>Rhamnus purshiana</i>	Cascara	FAC-	Native	5	14, 116, 193s, 294, 334-2
TAPA	<i>Tamarisk parviflora</i>	Tamarisk	NI	Non-Native	1	10E
THPL	<i>Thuja plicata</i>	Western red cedar	FAC	Native	10	33(upl overstory), 89, 116, 151, 193s, 243, 294, 300, 378, 400A
TSHE	<i>Tsuga heterophylla</i>	Western hemlock	FACU-	Native	2	33 (upl overstory), 89-1
		Unknown tree spp. #1			1	116E
		Unknown tree spp. #2			1	294
Shrubs						
ACCI	<i>Acer circinatum</i>	Vine maple	FAC-	Native	8	9C, 14, 33, 89-1, 116, 193, 243, 294
AMAL	<i>Amelanchier alnifolia</i>	Western serviceberry	FACU	Native	5	14, 243, 89-1, 13E-OC, 29E
COSE	<i>Cornus sericea</i> (stolonifera)	Red-osier dogwood	FACW	Native	22	9A, 9C, 14, 33, 89, 116, 151, 163, 193, 233s, 233NW, 239, 243, 294, 300, 334-1, 378, 10E, 13E-RO, 13E-OC, 29E, 41E

Code	Latin Name	Common Name	Indicator Status^	Native/ Non-Native	# of sites	Mitigation sites (unless otherwise noted) where plant species were observed
Shrubs						
CRDO	<i>Crataegus douglasii</i>	Black hawthorn	FAC	Native	9	9C, 14, 89-1, 151, 243, 300, 378, 29E, 41E
CRMO	<i>Crataegus monogyna</i>	One-seed hawthorn	FACU+*	Non-native	3	193G, 300, 10E
	<i>Crataegus</i> spp. (ornamental) - English?	Hawthorn	NL	Non-native	1	89-1
CYSC	<i>Cystisus scoparius</i>	Scott's broom	NL	Non-native	3	89-1, 193G, 239
ELAN	<i>Elaeagnus angustifolia</i>	Russian olive	FAC	Non-native	2	10E, 14E
GASH	<i>Gaultheria shallon</i>	Salal	FACU*	Native	1	89-1
HODI	<i>Holodiscus discolor</i>	Ocean spray	NL	Native	2	334-1, 378
ILAQ	<i>Ilex aquifolium</i>	English holly	NL	Non-native	1	89-1
LOIN	<i>Lonicera involucrata</i>	Black twin-berry	FAC+*	Native	12	9C, 14, 116, 163, 233s, 233NW, 243, 294, 334, 378, 13E-RO, 29E
	<i>Malus</i> spp.	Apple			1	193s
OECE	<i>Oemelia cerasiformis</i>	Indian plum	FACU	Native	4	14, 89-1, 294, 334-1
PHYCAP	<i>Physocarpus capitatus</i>	Pacific ninebark	FACW-	Native	11	9C, 116, 151, 163, 193, 233NW, 233NE, 243, 294, 300, 334-1
PYFU	<i>Pyrus (Malus) fusca</i>	Western crabapple	FACW	Native	6	89-1, 233s, 239, 243, 300, 378
RIAU	<i>Ribes aureum</i>	Golden currant	FAC+	Native	1	41E
	Ribes or <i>Physocarpus capitatus</i>	Currant or Ninebark		Native	1	239
ROGY	<i>Rosa gymnocarpa</i>	Baldhip rose	FACU	Native	1	116W
RONU	<i>Rosa nutkana</i>	Nootka rose	FAC	Native	6	9C, 14, 89, 243, 300, 29E
ROPI	<i>Rosa pisocarpa</i>	Peafruit rose	FAC	Native	11	14, 33, 89, 116, 151, 233NE, 243, 294, 300, 378, 41E
	<i>Rosa</i> spp.	Rose spp.		Native	11	9A, 9C, 33, 89-1, 163, 193G, 334-1, 10E, 13E-OC, 29E (multi-flower), 41E
RUDI	<i>Rubus discolor (procerus)</i>	Himalayan blackberry	FACU	Non-native	17	9A, 9C, 89, 116, 151, 163, 193, 233s, 233NE, 239, 243, 278, 294, 300, 334-1, 378, 400A
RULA	<i>Rubus laciniatus</i>	Evergreen blackberry	FACU+	Non-native	7	89, 163, 193, 239, 243, 300, 334-1
RULE	<i>Rubus leucodermis</i>	Black raspberry	NL	Native	1	193s
RUPA	<i>Rubus parviflorus</i>	Thimbleberry	FAC-	Native	2	33, 233s
RUSP	<i>Rubus spectabilis</i>	Salmonberry	FAC+	Native	13	9A, 14, 33, 89-1, 116, 151, 163, 193, 233s, 239, 300, 334-1, 29E
RUUR	<i>Rubus ursinus</i>	Trailing blackberry	FACU	Native	6	33, 89-1, 193s, 294, 300, 334-1
	<i>Satix alba</i> var. <i>vitellina</i>	Golden willow	FACW	Non-native	1	41E

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Shrubs						
SAEX	<i>Salix exigua</i>	Sandbar willow	OBL	Native	5	10E (Salix #2), 13E-RO, 13E-OC, 29E, 41E
SAGE	<i>Salix geyeriana</i>	Geyer willow	FACW+	Native	1	29E
SAHO	<i>Salix hookeriana</i>	Hooker willow	FACW-	Native	7	116E, 151, 193s, 233s, 239, 334, 400A
	<i>Salix hookeriana</i> or <i>piperi</i>				1	116W
	<i>Salix lasiandra</i> var. <i>caudata</i>	Pacific willow (eastern variety)		Native	1	14E
SALU	<i>Salix lucida</i> var. <i>lasiandra</i>	Pacific willow	FACW+	Native	20	9C, 14, 33, 46, 89, 116, 151, 163, 193, 233s, 233NW, 239, 243, 278, 294, 300, 334, 400A, 10E, 41E
SAPI	<i>Salix piperi</i>	Piper's willow	FACW	Native	1	239
SASC	<i>Salix scouleriana</i>	Scouler's willow	FAC	Native	12	9C, 14, 33, 46, 116, 151, 193, 239, 243, 300, 378, 400A
SASI	<i>Salix sitchensis</i>	Sitka willow	FACW	Native	17	9A, 9C, 14, 89, 116, 151, 163, 193, 233s, 239, 243, 278, 294, 300, 378, 400, 13E-RO
	<i>Salix</i> spp.	Willow			5	14 (alba?), 334-1 (Salix #1, #2), 10E (Salix #3), 41E, 50E
SARA	<i>Sambucus racemosa</i>	Red elderberry	FACU	Native	5	14, 33, 89-1, 116, 300
SPDO	<i>Spiraea douglasii</i>	Douglas' spiraea	FACW	Native	12	9A, 9C, 33, 46, 89-1, 116, 151, 163, 243, 278, 294, 334-1
SYAL	<i>Symphoricarpos albus</i>	Common snowberry	FACU	Native	5	9A, 9C, 89, 233NE, 29E
VAOV	<i>Vaccinium ovatum</i>	Evergreen huckleberry	NL	Native	1	334-1
VAPA	<i>Vaccinium parvifolium</i>	Red huckleberry	NL	Native	1	33
VIOP	<i>Viburnum opulus</i>	High-bush cranberry	NL	Native	1	193s
Herbs						
ACMI	<i>Achillea millefolium</i>	Common yarrow	FACU	Native	1	29E
AGRE	<i>Agropyron repens</i>	Quackgrass	FAC-	Non-native	3	243, 334-1, 10E
	<i>Agrostis capillaris</i> (tenuis)	Colonial bentgrass	NL	Non-native	4	89-1, 193s, 300, 13E-OC
	<i>Agrostis gigantea</i> (alba var. alba)	Redtop bentgrass	NI	Non-native	3	89-1, 193G, 400A
	<i>Agrostis</i> spp.	Bentgrass spp.			17	9 (A and B), 14, 33, 46, 89, 116, 151, 163, 193s, 233, 239, 243, 278, 294, 334, 378, 400
AGST	<i>Agrostis stolonifera</i>	Creeping bentgrass	FAC*	Non-native	1	13E-RO
	<i>Agrostis stolonifera</i> (or <i>capillaris</i>)	Creeping (or colonial bentgrass)	FAC*	Non-native	1	13E-NCC
AICA	<i>Aira caryophyllea</i>	Silver hairgrass	NL	Non-native	1	378
ALPL-AQ	<i>Alisma plantago-aquatica</i>	Broadleaf water-plantain	OBL	Native	3	378, 400, 13E-OC

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Herbs						
	<i>Alisma</i> spp.	Waterplantain spp.			5	9C, 116, 239, 278, 41E
ALAE	<i>Alopecurus aequalis</i>	Short-awn foxtail	OBL	Native	2	14E, 41E
ALGE	<i>Alopecurus geniculatus</i>	Water foxtail	OBL	Native	5	89-1, 116, 243, 334, 378 (or aequalis)
ALPR	<i>Alopecurus pratensis</i>	Meadow foxtail	FACW	Non-native	13	9, 14, 89, 116W, 151, 163, 243, 300, 378, 13E-RO, 13E-NCC, 41E, 50E
	<i>Amsinckia menziesii</i> or <i>retrorsa</i>	Fiddleneck fireweed			1	50E
ANMA	<i>Anaphalis margaritacea</i>	Pearly everlasting	NL	Native	1	233NE
ANOD	<i>Anthoxanthum odoratum</i>	Sweet vernalgrass	FACU	Non-native	9	9A, 14, 89, 233NW, 243, 300, 334, 378, 400A
	Aquatic #3				1	193s
	Aquatic 1				1	13E-OC
	Aquatic 2				1	13E-OC
	Aquatic 3				1	13E-OC
	<i>Arctium</i> spp.	Burdock			1	41E
ARAB	<i>Artemisia absinthium</i>	Wormwood	NL	Non-native	1	50E
	<i>Artemisia</i> spp.	Wormwood			2	29E, 41E
	<i>Aster</i> spp.	Aster			1	13E-NCC
ATFI	<i>Athyrium filix-femina</i>	Lady fern	FAC	Native	7	33, 89-1, 116, 151, 193s, 239, 294
BEIN	<i>Berteroa incana</i>	Berteroa	NL	Non-native	1	29E
BICE	<i>Bidens cernua</i>	Nodding beggars-ticks	FACW+	Native	1	193s
	<i>Bidens</i> spp.	Beggar-ticks			1	151
	<i>Bidens</i> spp. (3 leaves)	Beggars-ticks			1	116W
BITR	<i>Bidens tripartita</i>	Three-lobed beggars-ticks	FACW	Native	1	151
BLSP	<i>Blechnum spicant</i>	Deer fern	FAC+	Native	1	33
	<i>Brasenia</i> spp.	Water-shield			1	116E
	<i>Brassica</i> spp.	Unknown mustard			3	151, 29E (#1, 2, 3), 50E (#1, 2, 3, 4)
	<i>Bromus</i> #1 (awns, tectorum)				1	50E
	<i>Bromus</i> #2 (fuzzy)				1	50E
BRIN	<i>Bromus inermis</i>	Smooth brome	NL	Native	2	29E, 50E
BRMO	<i>Bromus mollis</i>	Soft brome	NL	Non-native	3	9A, 334, 50E

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Herbs						
	Bromus spp.	Brome			4	10E, 13E-OC, 41E, 50E
	Bromus spp. #2 (fuzzy/long awns-lechtorum?annual)	Brome			1	29E
	Callitriche spp.	Water-starwort			3	116W, 163, 193
	Capsella bursa-pastoris	Common shepherd's purse	FACU	Non-native	1	50E
	Cardamine spp.	Bittercress			1	29E
	Carex #1, #2, #3, #4	Sedge spp.			1	14E
CADE	Carex deweyana	Dewey sedge	FACU*	Native	2	33, 233s
	Carex feta (leporina? Clumping)	Sedge spp.			1	9C
CALEN	Carex lenticularis	Lenticular sedge	FACW+	Native	2	163, 278
CALEP	Carex leporina	Harefoot sedge	FACW	Native	1	400B
CAOB	Carex obnupta	Slough sedge	OBL	Native	14	9C, 33, 46, 89, 116, 163, 193, 239, 243, 278, 334-1, 378, 400, 13E
CAOE	Carex oederi	Green sedge	NL	Native	1	163
CAPACH	Carex pachystachya	Thick-head sedge	FAC	Native	7	9A, 9C (or scoparia), 14, 89-2, 151, 243, 334
CAPA	Carex pauciflora	Fewflowered sedge	OBL	Native	1	33
CARO	Carex rostrata	Beaked sedge	OBL	Native	2	116E, 300
	Carex rostrata or nebrascensis	Sedge spp.			1	13E
	Carex rostrata or vesicaria?	Sedge spp.			1	334-1
CASC	Carex scoparia	Pointed broom sedge	FACW	Native	6	14, 163, 193s, 243, 300, 378
	Carex spp.	Sedge spp.			3	89-1, 10E, 13E-OC
	Carex spp. #1 (small head, occurs in clumps)	Sedge spp.			1	29E
	Carex spp. #2	Sedge spp.			1	29E
	Carex spp. #2 (big rhizomes)	Sedge spp.			1	9C
	Carex spp. #2 (feta?)	Sedge spp.			1	89-1
	Carex spp. #2 (scoparia?)	same as #89, #2			1	334-1
	Carex spp. #3 (short clump)	Sedge spp.			1	9C
	Carex spp. (looks like lenticularis)	Sedge spp.			1	13E-NCC
	Carex spp. (small-clumped, compacted)	Sedge spp.			1	13E-NCC

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Herbs						
CAST	<i>Carex stipata</i>	Sawbeak sedge	NL	Native	17	9A, 9C, 14, 116W, 151, 163, 193s, 239, 278, 300, 334-1, 378, 400, 13E-NCC, 29E, 41E, 50E
	<i>Carex vesicaria</i> var. <i>major</i> (<i>exsiccata</i>)	Inflated sedge	OBL	Native	1	29E
	<i>Castilleja</i> spp.	Yellow paintbrush			1	29E
	<i>Centaurea</i> spp.	Knapweed spp.			1	13E-OC
	<i>Centaurea</i> spp.	Bachelor's button (blue flower) ?			1	13E-OC
	<i>Centaureum</i> spp.	Centaury spp.			1	13E-OC
CEVU	<i>Cerastium vulgatum</i>	Chickweed, common mouse-ear	FACU	Native	5	9A, 9B, 14, 89-1, 243
CEDE	<i>Ceratophyllum demersum</i>	Hornwort; Coontail	OBL	Native	1	163
	<i>Ceratophyllum</i> spp. (Aquatic 5)	Hornwort; Coontail		Native	1	193s
	<i>Chenopodium</i> spp.	Goosefoot			1	116E
CHLE	<i>Chrysanthemum leucanthemum</i>	Ox-eye daisy	NL	Non-native	5	9A, 9B, 116W, 243, 13E-RO
CIAR	<i>Cirsium arvense</i>	Canada thistle	FACU+	Non-native	16	9A, 9C, 14, 89-1, 116, 151, 163, 193, 233NE, 239, 294, 300, 400A, 10E, 14E (?), 41E
	<i>Cirsium</i> spp.	Thistle spp.			3	13E-RO, 14E (vulgare?), 50E
CIVU	<i>Cirsium vulgare</i>	Bull thistle	FACU	Non-native	16	9C, 14, 89-1, 116, 151, 163, 193, 233NE, 239, 243, 300, 378, 400A, 10E, 13E-OC, 29E
	<i>Claytonia</i> spp.	Springbeauty			1	33
	<i>Clematis</i> spp. ?	Virgins-bower; Clematis			1	29E
COMA	<i>Conium maculatum</i>	Poison hemlock	FAC+	Non-native	2	13E-NCC, 50E
	<i>Convolvulus</i> spp.	Morning glory			2	294, 400A
CRCA	<i>Crepis capillaris</i>	Smooth hawkbeard	FACU*	Native	1	239
CYCR	<i>Cynosurus cristatus</i>	Crested dogtail	NL	Non-native	1	243
DAGL	<i>Dactylis glomerata</i>	Orchardgrass	FACU	Non-native	3	193s, 233NE, 334-1
DACA	<i>Daucus carota</i>	Queen Anne's lace	NL	Non-native	2	9A, 9B
DECA	<i>Deschampsia caespitosa</i>	Tufted hairgrass	FACW	Native	2	193s, 13E
	<i>Dianthus</i> spp.	Pink spp.			1	29E
	<i>Digitalis</i> spp.	Foxglove			1	33
	<i>Dipsacus</i> spp.	Teasel			3	9A, 9C, 41E

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Herbs						
DIST	<i>Distichlis stricta</i>	Alkali saltgrass	NL	Native	1	10E
DREX	<i>Dryopteris expansa</i>	Wood fern	NL	Native	1	33
ECCR	<i>Echinocloa crusgalli</i>	Barnyard grass	FACW	Non-native	1	378
ELAC	<i>Eleocharis acicularis</i>	Needle spikerush	OBL	Native	1	300
ELOB	<i>Eleocharis obtusa</i>	Ovoid spikerush	OBL	Native	1	378
ELPA	<i>Eleocharis palustris</i>	Creeping spikerush	OBL	Native	15	9C, 46, 89-1, 116, 151, 163, 193s, 243, 278, 300, 378, 400B, 13E-OC, 14E, 50E
	<i>Eleocharis</i> spp.	Spikerush			2	29E, 41E
	<i>Elodea (nuttallii?)</i>	Nuttall's waterweed		Native	1	163
ELCA	<i>Elodea canadensis</i>	Broad waterweed	OBL	Native	1	193s
	<i>Elodea</i> spp.? (Aquatic l)	Waterweed			1	193s
ELMO	<i>Elymus mollis</i>	American dunegrass	NL	Native	1	46
	<i>Elymus</i> spp.	Wild rye			2	378, 13E-OC
EPCI	<i>Epilobium ciliatum</i>	Hairy willowherb	FACW-	Native	3	9C, 193G, 400A
	<i>Epilobium</i> spp.	Willowherb			19	9A, 14, 33, 46, 89, 116, 151, 163, 193s, 239, 243, 300, 334-2, 378, 400B, 13E-RO, 13E-OC, 29E, 41E
EQAR	<i>Equisetum arvense</i>	Field horsetail	FAC	Native	7	9A, 89-1, 294, 400A, 14E, 29E, 50E
	<i>Equisetum</i> spp.	Horsetail spp.			6	9C, 14, 116, 243, 278, 13E-NCC
EQTE	<i>Equisetum telmateia</i>	Giant horsetail	FACW	Native	5	151, 193, 239, 294, 400A
	<i>Erigeron</i> spp.	Fleabane spp.			1	29E
FEAR	<i>Festuca arundinacea</i>	Tall fescue	FAC-	Non-native	9	9, 14, 89-1, 116E, 243, 378, 400A, 10E, 50E
FEID	<i>Festuca idahoensis</i>	Blue bunchgrass	FACU*	Native	1	41E
FERU	<i>Festuca rubra</i>	Red fescue	FAC+	Native	13	9, 14, 33, 89-1, 116, 193, 233NW, 243, 334-1, 400A, 10E, 13E, 14E
	<i>Fragaria</i> spp.	Strawberry spp.			1	163
	<i>Galium (aparine? Sticky, whorl of 8)</i>	Cleavers			1	29E
GAAP	<i>Galium aparine</i>	Cleavers bedstraw	FACU	Native	5	89, 116W, 193s, 239, 50E
GATR	<i>Galium trifidum</i>	Small bedstraw	FACW+	Native	8	9C, 46, 89-1, 116W, 151, 163, 243, 278
	<i>Geranium</i> spp.	Geranium			3	89-2, 193s, 334-2

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Herbs						
GEMA	Geum macrophyllum	Largeleaf avens	FACW-*	Native	1	300
	Geum or Mustard spp. (unknown 2)				1	50E
	Geum spp.	Avens spp.			5	9C, 151, 233s, 243, 29E
	Glyceria #2	Mannagrass spp.			1	300
	Glyceria #3 (grandis ?)	Reed mannagrass			1	13E-OC
GLBO	Glyceria borealis	Northern mannagrass	OBL	Native	3	378, 400, 13E-RO
	Glyceria borealis ?	Northern mannagrass	OBL	Native	1	13E-OC
	Glyceria borealis or occidentalis	Mannagrass			1	239
GLEL	Glyceria elata	Tall mannagrass	FACW+	Native	7	33, 116, 163, 193s, 294, 300, 13E-OC
GLGR	Glyceria grandis	Reed mannagrass	NL	Native	5	116, 151, 193s, 13E-RO, 50E
	Glyceria occidentalis (or grandis)	Northwestern mannagrass	OBL	Native	1	151
	Glyceria spp.	Mannagrass spp.			4	116E, 278 (grandis?), 378, 400A
	Gnaphalium spp.	Cudweed spp.			1	378
	Heracleum spp.	Cow parsnip			2	29E, 41E
	Hippurus or Myriophyllum (Aq #2)				1	378
HOLA	Holcus lanatus	Common velvetgrass	FAC	Non-native	15	9, 14, 33, 89, 116, 151, 163, 193, 233, 239, 243, 300, 334, 378, 400
	Holcus mollis	Creeping velvetgrass	FACU*	Non-native	2	193s, 400A
HYAN	Hypericum anagalloides	Bog St. John's Wort	OBL	Native	5	46, 89-1, 163, 239, 378
HYPE	Hypericum perforatum	Common St. John's-wort	NL	Non-native	7	193s, 378, 400B, 13E-RO, 13E-OC, 41E, 50E
HYRA	Hypochaeris radicata	Spotted cat's-ear	FACU*	Non-Native	5	9A, 9B, 193G, 239, 334-1
	Impatiens noli-tangere	Yellow touch-me-not	FACW	Native	2	239, 294
	Impatiens spp.	Jewelweed			2	163, 29E
IRPS	Iris pseudacorus	Yellow iris	OBL	Non-native	2	116W, 243
	Juncus #1 (old stem)	Rush spp.			1	14E
	Juncus #2	Rush spp.			1	13E-OC
	Juncus #2 (balticus ?)	Rush spp.			1	14E
	Juncus (in a clump ?)	Rush spp.			1	13E-OC
JUAC	Juncus acuminatus	Tapertip rush	OBL	Native	12	9C, 46, 116, 151, 163, 193G, 243, 278, 300, 378, 400A, 13E

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Herbs						
JUAR	<i>Juncus articulatus</i>	Jointed rush	OBL	Native	5	9C, 163, 278, 400, 13E-RO
JUBU	<i>Juncus bufonius</i>	Toad rush	FACW	Native	3	46, 163, 29E (?)
JUEF	<i>Juncus effusus</i>	Soft rush	FACW	Native	20	9A, 9C, 14, 33, 89, 116, 151, 163, 193, 233s, 239, 243, 278, 294, 300, 334, 378, 400, 13E, 29E
JUEN	<i>Juncus ensifolius</i>	Daffierleaf rush	FACW	Native	13	14, 46, 89-1, 116, 163, 193, 243, 300, 378, 400, 13E-NCC, 13E-OC, 41E
JUFA	<i>Juncus falcatus</i>	Sickleleaf rush	FACW-	Native	1	46
JULE	<i>Juncus lesueurii</i>	Salt rush	FACW	Native	1	46
JUME	<i>Juncus mertensianus</i>	Merten's rush	OBL	Native	2	9A, 9C
	<i>Juncus oxymetris (?)</i>	Pointed rush	FACW+	Native	1	46
	<i>Juncus</i> spp.	Rush spp.			1	9C
	<i>Juncus</i> spp.	Rush spp.			1	378
	<i>Juncus</i> spp. (tenuis?)	Rush spp.			1	14
	<i>Juncus</i> spp. #1	Rush spp.			1	29E
	<i>Juncus</i> spp. #1	Rush spp.			1	334-2
	<i>Juncus</i> spp. #1 (cap>tepals, acuminatus?)	Rush spp.			1	89-1
	<i>Juncus</i> spp. #2	Rush spp.			1	29E
	<i>Juncus</i> spp. #2	Rush spp.			1	334-2
	<i>Juncus</i> spp. #3 (later infor. not articulation)	Rush spp.			1	29E
JUTE	<i>Juncus tenuis</i>	Slender rush	FACW-	Native	4	9C, 116E, 193s, 300
	<i>Labiate</i> spp.? Henbit?	Mint spp.			1	9B
	<i>Lactuca serriola</i>	Prickly lettuce	FACU	Non-native	1	400B
	<i>Lamium</i> spp.	Dead-nettle, henbit			1	50E
	<i>Lapsana communis?</i>	Nipplewort	NL	Non-native	1	294
	<i>Lathyrus</i> spp.	Peavine spp.			1	9A
LEOR	<i>Leersia oryzoides</i>	Rice cutgrass	OBL	Native	2	151, 163
LEMI	<i>Lemna minor</i>	Small duckweed	OBL	Native	3	151, 163, 193s
	<i>Lemna</i> spp.	Duckweed			7	116, 193, 243, 294, 378, 400A, 14E
	<i>Leontodon</i> spp.	Hawkbit			3	46, 116W, 378

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Herbs						
	<i>Linaria dalmatica</i>	Dalmation toadflax	NL	Non-native	1	13E-OC
	<i>Linaria</i> spp.	Toadflax			1	41E
LOMU	<i>Lolium multiflorum</i>	Italian ryegrass	NL	Non-native	1	116W
LOPE	<i>Lolium perenne</i>	Perennial ryegrass	FACU	Non-native	1	233NE
	<i>Lolium</i> spp.	Ryegrass			4	9A, 9B, 89, 193s
LOCO	<i>Lotus corniculatus</i>	Birdsfoot trefoil	FAC	Non-native	15	9, 14, 46, 89, 116, 151, 163, 193, 233s, 239, 243, 300, 334, 378, 400
LUPA	<i>Ludwigia palustris</i>	Water-purslane	OBL	Native	5	46, 151, 163, 193s, 400B
	<i>Ludwigia</i> spp.	Water-purslane			4	116, 193s, 378, 400A
	<i>Lupinus</i> (Polycephalum)	Lupine			1	9B
	<i>Lupinus</i> spp.	Lupine			4	9A, 9C, 193G, 41E
LUCA	<i>Luzula campestris</i>	Field woodrush	NL	Native	2	9A, 89-1
	<i>Luzula parviflora</i>	Small-flower woodrush	FAC-	Native	1	33
LYUN	<i>Lycopus uniflorus</i>	Northern bugleweed	OBL	Native	1	294
LYAM	<i>Lysichitum americanum</i>	Skunk cabbage	OBL	Native	1	33
LYSA	<i>Lythrum salicaria</i>	Purple loosestrife	FACW+	Non-native	3	239, 278, 294
	<i>Madia</i> spp.	Tarweed			1	378
MADI	<i>Maianthemum dilatatum</i>	False lily-of-the-valley	FAC	Native	1	89-1
	<i>Marah oreganus?</i>	Oregon bigroot	NL	Native	1	294
	<i>Melilotus</i> (yellow flowers)				1	10E
	<i>Melilotus alba</i>	White sweet clover	FACU	Non-native	1	13E
	<i>Melilotus officinalis</i>	Yellow sweet clover	FACU	Non-native	1	13E-OC
	<i>Melilotus</i> spp.	Sweet clover		Non-native	2	29E, 41E
MEAR	<i>Mentha arvensis</i>	Field mint	FACW-	Native	2	46, 29E
	<i>Mimulus</i> (guttatus ?)	Common monkeyflower			1	13E-OC
	<i>Mimulus</i> (pink ?)	Monkeyflower			1	13E-OC
MIGU	<i>Mimulus guttatus</i>	Common monkeyflower	OBL	Native	3	151, 378, 13E-RO
	<i>Mimulus</i> spp.	Monkey flower			1	13E-NCC
MYLA	<i>Myosotis laxa</i>	Small flower forget-me-not	OBL	Native	9	9C, 33, 193s, 243, 334-2, 378, 400B, 13E-RO, 13E-OC

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Herbs						
	Myosotis spp.	Forget-me-not			3	13E-NCC, 29E, 50E
	Najas ? (Aquatic 4)	Water-nymph			1	193s
	Najas spp. ?	Water-nymph			1	163
	Nuphar spp. #1	Water-lily			1	116E
	Nuphar spp. #2	Water-lily			1	116E
	Nymphaea spp.	White water lilly			1	116E
OESA	Oenanthe sarmentosa	Water parsley	OBL	Native	5	33, 151, 239, 378, 400
PAVI	Parentucellia viscosa	Yellow parentucellia	FAC-	Non-native	5	9A, 9B, 116W, 300, 378
PHAR	Phalaris arundinacea	Reed canarygrass	FACW	Non-native	23	9A, 9C, 14, 89-1, 116, 151, 163, 193, 233, 239, 243, 278, 294, 300, 334-1, 378, 400, 10E, 13E, 14E, 29E, 41E, 50E
	Phleum spp.	Timothy			6	9A, 9B, 89-1, 243, 13E-OC, 41E
PLLA	Plantago lanceolata	Rib plantain	FAC	Non-native	7	9A, 14, 116W, 233NW, 233NE, 334-1, 13E-RO
PLMA	Plantago major	Broadleaf plantain	FACU+	Non-native	3	116W, 400B, 29E
	Plantago spp.	Plantain			1	9C
	Poa annua	Annual bluegrass	FAC	Native	1	233NE
	Poa bulbosa ?	Bulbous bluegrass	NL	Non-native	1	50E
	Poa pratensis ?	Kentucky bluegrass	FAC	Non-native	2	14E, 50E
	Poa spp.	Bluegrass			11	9A, 14, 33, 89, 243, 334, 10E, 13E-NCC, 14E, 29E, 41E
	Poa spp. #1	Bluegrass			1	9C
	Poa spp. #2	Bluegrass			1	9C
POCU	Polygonum cuspidatum	Japanese knotweed	FACU*	Non-native	1	239
POHY	Polygonum hydropiperoides	Mild waterpepper	OBL	Native	2	151, 378
POPE	Polygonum persicaria	Ladysthumb	FACW	Native	5	116, 151, 163, 278, 400B
		Smartweed; Knotweed;				
		Doorweed			3	9C, 239, 378
	Polygonum spp.	Annual rabbit-foot grass	FACW	Non-native	1	10E
POMU	Polystichum munium	Sword fern	FACU	Native	2	89-1, 294
	Potamogeton spp.	Pondweed			1	116W
	Potamogeton #1 spp.	Pondweed			1	378

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Herbs						
	Potamogeton #2 spp.	Pondweed			1	378
	Potamogeton crispus (Aquatic 6)	Curly pondweed	OBL	Non-native	1	193s
	Potamogeton foliosus	Leafy pondweed	OBL	Native	6	46, 116W, 151, 163, 193s (aquatic 2), 378 (aquatic 1)
	Potamogeton spp.	Pondweed		Native	5	46, 116E, 400, 13E-OC, 14E
POAN	Potentilla anserina	Pacific silverweed	OBL	Native	2	46, 163
POPA	Potentilla palustris	Marsh cinquefoil	OBL	Native	3	89-1, 116W, 14E
	Potentilla spp.	Cinquefoil			1	29E
PRVU	Prunella vulgaris	Self-heal; Heal-all	FACU+	Non-native	3	9A, 193s, 13E-RO
	Pteridium aquilinum var. pubescens	Bracken fern	FACU	Native	1	89-1
	Ranunculus ? scelosus?	Buttercup			1	41E
RAAQ	Ranunculus aquatilis	Water buttercup	OBL	Native	1	13E-OC
RARE	Ranunculus repens	Creeping buttercup	FACW	Non-native	15	9, 14, 33, 89, 116, 151, 163, 193, 233, 239, 243, 294, 334, 378, 400B
RASC	Ranunculus sceleratus	Celery leaved buttercup	OBL	Non-native	3	9C, 116E, 378
RONA-AQ	Rorippa nasturtium-aquaticum	Water-ress	NL	Non-native	4	193s, 400, 29E, 50E
	Rorippa spp. (yellow petals)	Cress			1	193s
RUAC	Rumex acetosella	Sheep sorrel	FACU+	Non-native	6	9A, 14, 163, 243, 300, 334-1
RUCR	Rumex crispus	Curly dock	FAC+	Non-native	20	9A, 9C, 46, 89, 116, 151, 193s, 243, 278, 294, 300, 334, 378, 400B, 10E, 13E-OC, 13E-NCC, 29E, 41E, 50E
RUOB	Rumex obtusifolius	Bitter dock	FAC	Native	6	116E, 233NW, 294, 300, 378, 400B
RUOC	Rumex occidentalis	Western dock	FACW+	Native	3	116W, 151, 233NW
	Rumex spp.	Dock spp.			3	193s, 13E-RO, 50E
	Sagittaria spp.	Arrowhead			2	116E, 193G
SCAC	Scirpus acutus	Hardstem bulrush	OBL	Native	9	116, 151, 163, 193, 243, 378, 400, 10E, 14E
	Scirpus americanus (Scirpus #1)	Three-square bulrush	OBL	Native	2	9C, 10E
SCCY	Scirpus cyperinus	Woolly sedge	OBL	Native	3	116, 151, 278
SCMI	Scirpus microcarpus	Small-fruited bulrush	OBL	Native	14	9C, 33, 116, 151, 163, 193, 239, 294, 378, 400, 13E-OC, 13E-NCC, 41E (?), 29E

Code	Latin Name	Common Name	Indicator Status^	Native/ Non-Native	# of sites	Mitigation sites (unless otherwise noted) where plant species were observed
Herbs						
	Scrophularia spp.	Unknown Scroph #1 (linaria?)			1	50E
	Scrophularia spp.	Unknown Scroph #2 (linaria?)			1	50E
SEJA	Senecio jacobaea	Tansy ragwort	FACU*	Non-native	3	89-1, 116W, 334
	Sisyrinchium (white?)	Sisyrinchium			1	29E
	Sisyrinchium douglasii	Blue-eyed grass	FACU	Native	1	13E-OC
	Sisyrinchium spp. (purple)	Sisyrinchium			2	378, 14E
	Smilacina stellata	Star-flowered False Solomon's seal	FAC-	Native	1	29E
SODU	Solanum dulcamara	Bittersweet nightshade	FAC+	Non-native	14	9C, 14, 89-1, 116, 151, 163, 193, 239, 278, 294, 300, 400B, 29E, 41E
	Solanum spp.	Nightshade			1	193s
	Solidago	Goldenrod			2	9C, 294
	Sonchus spp.	Sow-thistle			1	400B
	Sonchus spp. or Lactuca serriola	Sow-thistle			1	13E-NCC
SPEM	Sparganium emersum	Narrowleaf burreed	OBL	Native	5	46, 151, 163, 243, 400B
SPEU	Sparganium eurycarpum	Giant burreed	OBL	Native	1	378
	Sparganium spp.	Bur-reed			6	116, 193s, 243, 278, 378, 13E-OC
	Spiranthes spp.	Ladies-tresses			1	13E-OC
STCO	Stachys cooleyae	Cooley hedgenettle	NL	Native	6	33, 89-1, 151, 294, 300, 13E-OC
	Stachys spp.	Hedgenettle spp.			1	13E-RO
	Symphytum spp.	Comfrey			1	116E
TADO	Tanacetum douglasii	Western tansy	NL	Native	1	116W
TAVU	Tanacetum vulgare	Common tansy	NI	Non-native	6	9A, 9C, 13E-RO, 29E, 41E, 50E
	Taraxacum officinale	Common dandelion	FACU	Non-native	1	29E
TITR	Tiarella trifoliata	Three-leaf foamflower	FAC-	Native	1	33
	Tolmica spp.	Pig-a-Back spp.			1	33
	Tragopogon spp.	Goatsbeard			1	10E
TRIDU	Trifolium dubium	Least hop clover	NL	Non-native	4	9, 116W, 334-1(?), 29E
	Trifolium dubium or Medicago	Least hop clover			1	13E-NCC

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Herbs						
	Trifolium hybridum	Alsike clover	FAC	Non-native	1	13E-NCC
TRIPT	Trifolium pratense	Red clover	FACU	Non-native	8	9, 89-1, 116, 193, 239, 243, 29E, 41E
	Trifolium pratense ? or procumbens	Red clover			1	14E
TRIRE	Trifolium repens	White clover	FAC*	Non-native	10	9, 33, 89-1, 116, 193, 233NW, 233NE, 243, 400B, 29E
	Trifolium spp.	Clover			5	378, 10E, 13E-RO, 14E, 50E
	Trifolium spp. (hybridum?)	Clover			1	13E-OC
TYAN	Typha angustifolia	Narrowleaf cattail	OBL	Native	1	400B
TYLA	Typha latifolia	Common cattail	OBL	Native	18	9C, 46, 89, 116E, 151, 163, 193, 239, 243, 278, 294, 300, 378, 400, 10E, 13E-OC, 14E, 41E
	Typha spp.	Cattail spp.			1	13E-RO
	Umbelliferae	Unknown umbal			1	50E
	Unknown #1 (Aster?)				1	10E
	Unknown #1 (Melilotus spp.)				1	14E
	Unknown #2 (mallow?)				1	14E
	Unknown #3 (epilobium ?)				1	10E
	Unknown mustard	Mustard spp.			1	400B
	Unknown #2 (atriplex or mustard?)				1	10E
	Unknown (gilia ?)				1	13E-OC
URDI	Urtica dioica	Stinging nettle	FAC+	Native	3	193, 334-1, 29E
	Urtica spp.	Nettle			1	41E
UTMI	Utricularia minor	Small bladderwort	OBL	Native	1	400A
	Utricularia spp.	Bladderwort			1	116E
UTVU	Utricularia vulgaris	Common bladderwort		Native	1	163
	Verbascum spp.	Mullein			3	13E-OC, 29E, 41E
VEAM	Veronica americana	American speedwell	OBL	Native	15	9C, 14, 89-1, 116, 151, 193s, 243, 300, 334-1, 378, 400, 13E-RO, 29E, 41E, 50E
VEAN-AQ	Veronica anagallis-aquatica	Water speedwell	OBL	Native	2	13E-RO, 29E
VEAR	Veronica arvensis	Common speedwell	FACU*	Non-native	1	89-1

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Herbs						
VESC	<i>Veronica scutellata</i>	Marsh speedwell	OBL	Native	7	14, 33, 46, 89-1, 151, 163, 243
VICR	<i>Vicia cracca</i>	Tufted vetch	NL	Non-native	1	193G
VIHI	<i>Vicia hirsuta</i>	Tiny vetch	NL	Non-native	3	9A, 243, 334-1
VISA	<i>Vicia sativa</i>	Common vetch	NL	Non-native	4	9A, 9B, 239, 334-1
	<i>Vicia</i> spp.	Vetch			3	89-1, 233NW, 29E
	<i>Vicraca ? Spp.</i>				1	9A
	<i>Viola</i> spp.	Violet spp.			1	33
	<i>Xanthium</i> spp.	Cocklebur			1	233NE
	<i>Zizania</i> spp.	Wild rice			2	193G, 378
		Unknown thin-stemmed aquatic			1	400A
		Moss			1	151
		Unknown thin-stemmed aquatic			1	46
		Unknown aquatic spp.			1	50E
		True moss			1	14E
		Moss			2	89-1, 29E
		Reddish brown algae			1	243
		Unknown aquatic			1	116E
		Unknown grass (2 florets)			1	116E
		Moss			1	13E-RO

[^]Indicator Status of the observed plant species came from:

- 1) Reed, P.B., Jr. 1988. National list of plant species that occur in wetlands: Northwest (Region 9). U.S. Fish Wildl. Serv. Biol. Rep. 88(26.9). 89 pp.
- 2) 1993 Supplement to list of plant species that occur in wetlands: Northwest (Region 9).